

VR2AR USER MANUAL

*How to use the
VR2AR receiver.*



www.vemco.com

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Summary of Manual

This manual is intended to provide VEMCO users with the information they require to use the **VR2AR receiver**. VEMCO highly recommends that the user fully read the manual before using the equipment or the VUE software.

Section 1: Introduction

Getting to know the VR2AR receiver

Section 2: Getting started

Testing the VR2AR before deployment

Section 3: Communication

How to use VUE with a VR2AR

Section 4: Deployment

Important points to consider in a deployment plan and the most common attachment method

Section 5: Maintenance

How to care for the VR2AR, including replacing the battery, and how to prepare it for storage

Section 6: Additional Information

Additional information about the VR2AR that is good to know but not mandatory for basic operations

Section 7: Common Questions

Answers to frequently asked questions related to using the VR2AR receivers

Section 8: Troubleshooting

Solutions to common issues that may arise

Section 9: Appendix

For the latest versions of user manuals and software, visit www.vemco.com.

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WARNING

If the VR2AR is not used in the manner specified by the manufacturer protection may be impaired.

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1 Introduction

1.1 System Overview

The VR2AR (Receiver, Transmitter, and Acoustic Release) is a submersible, single-channel acoustic receiver capable of transmitting its assigned ID code, identifying other VEMCO coded transmitters in the area, acoustically communicating with a VR100-200 receiver, and separating from its mooring after an acoustic command. The receiver operates on a factory set frequency of 69 kHz.

The VR2AR is housed in a corrosion resistant cylindrical plastic high pressure case. The case incorporates an integral hydrophone at one end of the case and a replaceable mooring lug at the other end. The VR2AR has the ability to:

- Detect VEMCO 69kHz coded tags
- Store detections and events within internal memory
- Transmit an ID code at a user chosen rate (select transmitting options to choose from)
- Communicate with VUE software through a Bluetooth connection
- Quickly and reliably release from its mooring lug (typically within one minute)
- Easily re-arm the release mechanism
- Allow easy attachment of floatation to exterior casing for buoyancy
- Respond to a VR100-200 without entering a specific serial number or location
- Communicate additional status information to the VR100-200 and make changes to select receiver and transmitter operations while deployed, such as power settings
- Report release status, arm the release, and activate the release through the VR100-200 acoustic communication
- Report range and depth information as the unit is rising to the surface

The VR2AR communicates to the surface through our VR100-200 active tracking receiver. It is compatible with all VR100-200 models sold since January 2013. Customers will require a new transponding hydrophone to attach to the VR100 to communicate with either the VR2AR or the VR2Tx. VR2AR receiver information that can be accessed through the VR100-200 includes:

- Unit health
- Number of detections
- Programmable watch table
- Tilt, depth and temperature
- Battery life and memory usage
- Receiver range which will aid in locating the VR2AR
- Built in Transmitter configuration allowing users to change the power setting as well as enable and disable the transmitter



The release mechanism is a mooring lug that is controlled by a DC motor using a titanium shaft. The exterior of the mooring lug shaft is copper to reduce bio-fouling.

Some common uses for VR2AR receivers are:

- Monitoring fish movements using acoustic gates across shorelines
- VEMCO Positioning System (VPS) arrays to track animals within a specific area



1.2 VR2AR Case

The VR2AR receiver is housed in the black plastic high pressure case. The case consists of an outer cylinder that is removed to install the D-cell Lithium battery, the endcap which houses the hydrophone and connects to the metal internal casing, and the mooring lug that separates from the case to allow the receiver to rise to the surface. When the outer cylinder is removed, the internal casing protecting the electronics can be seen. The case dimensions are found in section 6.5.

A crucial part of the VR2AR is the hydrophone, located at the top of the receiver. The hydrophone is similar to a microphone – it “listens” for sounds and transfers them to the electronics inside the receiver. The VR2AR’s hydrophone also acts as a speaker and transmits a unique ID code at a user-set interval. This ability to both listen and broadcast allows the VR2AR to communicate with a VR100-200 through a transponding hydrophone. Like all hydrophones, the VR2AR hydrophone is a sensitive piece of equipment. Avoid striking the hydrophone or allowing any object to impact it as damage may occur that would prevent the receiver from detecting tags or communicating with the VR100-200.



The VR2AR is shipped closed. The case only needs to be opened to power the unit. Because the VR2AR is often shipped with the battery installed but not connected, the first task is usually to open the case and either connect or install the battery. The only other time the case needs to be opened is when replacing the battery or preparing the unit for long-term storage. Connecting the battery is explained in Section 2, along with opening and closing the receiver case. Replacing the battery is explained in Section 5.1.



WARNING

The VR2AR pressure case and seal have a maximum static depth rating of **500 meters** (730 psi). Physical shocks to the receiver, such as bumping into a solid object, when it is at any depth can result in a considerably higher pressure on the casing than just the depth pressure and water may enter the VR2AR case. If the O-rings or their mating surfaces are dirty or damaged, then water may also enter the receiver case. If you are suspicious that water has entered the receiver, then follow the suggestions in section 8.2.2 for troubleshooting a pressurized case.

VR2AR Quick Facts	
Dimensions	397 mm (15.63") x 81 mm (3.2") diameter
Weight	2350 g in air; 490 g in water
Receive Frequency	69.0 kHz
Battery Life	Approximately 14 months
Memory	16 MB (~1.6 million detections, depending on sensor log configuration)
Operating temperature	-5°C to +40 °C; Water <i>must not freeze</i> .
Maximum Depth	500 meters (730 psi)
Software	VEMCO User Environment (VUE) software
Communication	In air: <i>Bluetooth</i> communication with VUE software In water: Acoustic communication with a VR100-200 using a transponding hydrophone

2 Getting Started

After the VR2AR has been removed from the packaging and inspected for any damage that may have occurred during shipping, power and test the unit to ensure you can communicate with the receiver and it is working properly. The VR2AR was shipped with the batteries installed but NOT connected.

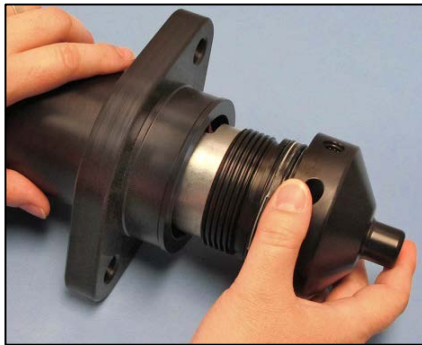


VR2AR was shipped with the battery installed but **NOT connected**.

2.1 Connect Battery

STEP 1

Open the VR2AR case as described in section 5.1.1. You'll find two batteries in the Metal Internal Casing. The smaller battery operates the motor and is already connected. The D-cell Lithium battery powers all other operations in the VR2AR and is usually shipped unconnected within the receiver.



STEP 2

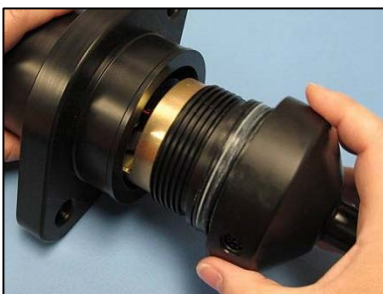
Position the receiver so you can see the Status Light.

Connect the two battery connector halves together until a "click" is heard and the VR2AR receiver's light begins flashing. Watch for a long green light to indicate the self-tests were successful. If you see the long red light followed by more flashes, then contact VEMCO for instructions.



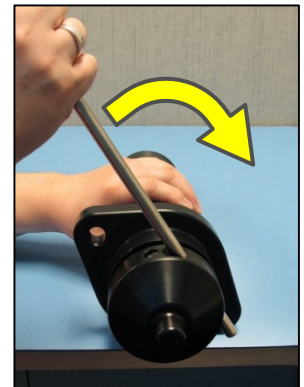
STEP 3

Close the receiver case by following the instructions in section 5.1.4



WARNING

Do not over-tighten the case pieces together or they may be damaged.



2.2 Testing

Before deploying a VR2AR, it is wise to test it with a tag and a VR100-200 receiver to verify that it is operating properly. This test also creates a VRL file containing all the configuration information for this receiver – handy to keep as a record of the receiver’s configuration.

Tests can, and should, be done in both air and water.

2.2.1 In-Air Test

The VR2AR can detect coded tags and communicate with a VR100-200 in air but does so at a much reduced range compared to the range capabilities when the VR2AR is in water. Perform air tests away from electrical noise sources such as motors, PC screens, or fluorescent lights.

Perform air tests away from electrical noise sources such as motors, PC screens, or fluorescent lights.

To perform an in-air test, follow the steps below.

1. Use Bluetooth to setup receiver for test:
 - a. Activate the *Bluetooth* feature on the VR2AR (section 3.2).
 - b. Establish communication between the VR2AR and VUE software (section 3.3).
 - c. Select the VR2AR’s transmit mode (section 3.4).
 - d. Begin a Study. Section 3.8.1 has the details of how to begin a study, also known as initializing a receiver.
 - e. Disconnect the wireless communication with the VR2AR (click the red box with the “X” in the receiver ribbon).
2. Activate at least one 69 kHz tag and place it less than 30 cm (12”) away from the hydrophone so the side of the tag is facing the side of the hydrophone.
3. Wait while the VR2AR records the tag(s) near it. You can watch the red flash patterns as the tag is detected and the data is stored in memory. Each faint red flash of the Status Light is a received ping and a long, bright red flash is a stored detection. If the flash patterns are different, compare it to the Status Light Meanings chart (section 6.2).
4. Communicate using the transponding hydrophone and VR100-200 (details about using the VR100-200 are found in the VR100 related user manuals).
 - a. Connect the transponding hydrophone to the hydrophone connector on the VR100-200
 - b. Place the caged end of the hydrophone within 15 cm (6”) of the hydrophone on the VR2AR.
 - c. Turn on the VR100-200.
 - d. Select “Transpond” in the main screen.
 - e. Select “Scan” and wait for the VR2AR’s serial number to appear on the screen.
 - f. Select the VR2AR.
 - g. Select “Status...” from the menu (press “1” on keypad).



- h. Select “Get Range” (press “1” on keypad). This establishes communication between the VR2AR and the VR100-200 and reduces the “talk time” necessary to communicate.
- i. Press the “MENU” button twice to move back to the Transponding menu.
- j. Select “Acoustic Release” (#3)
- k. Select “Status” to view the VR2AR’s release status. It should report “unarmed” at this stage. Press MENU to go back to the menu.
- l. Select “Arm” from the menu and wait for the status to change to “Armed”.
- m. Select “Activate” and enter the 5-digit PIN code corresponding to this VR2AR when prompted. Select the right selection button (“Activate”) again.
- n. Wait while the mooring lug is ejected from the VR2AR; status is reported as “Opening” during this phase.

Find more transponding features in the VR100 user manual addendum.

VR2AR:000001 170m
Enter the PIN code:
00000
Activate

- 5. Communicate with the VR2AR again through VUE (see sections 3.2 and 3.3). Before continuing, take a quick look at the number of detections and pings received listed in the receiver status information.
- 6. Offload the data that was collected during the test (section 3.9), creating a VRL file.
- 7. View the data to verify that the data was stored and retrieved without problems. Instructions for viewing data are found in the VUE manual.
- 8. Reset the mooring lug for another acoustic release (see section 4.4). NOTE: The acoustic communication between the VR100-200 and the VR2AR must time-out (be dormant for more than 10 minutes) in order for the receiver to be reset and able to release again.
- 9. Begin another study (see section 3.8.1) to erase the data in the VR2AR.

2.2.2 In-Water Test

Tests performed in water are almost identical to the in-air test explained above. The only difference is that the equipment does not need to be as close in water as it does in air. For example, the tag could be positioned 5 meters from the receiver for testing purposes. In-water tests are often performed to establish an ideal range for the VR2AR receivers in the environment in which they are moored. Details of conducting a Range Test are found at www.vemco.com/customer-service/?cs-tutorials.

3 VUE Communication

The VR2AR uses either *Bluetooth* or acoustic communication, depending on the nature of the communication. *Bluetooth* communication occurs in air between the VR2AR and VUE software. It is with VUE that a study is initialized and data is offloaded. Acoustic communication occurs through water while the VR2AR is deployed and requires a VR100-200 receiver with a transponding hydrophone attached. The detailed instructions for using a VR100-200 with a receiver are located in the VR100-200 Transponding manual. This section details how to communicate with the VR2AR using VUE software and a *Bluetooth* connection.

Bluetooth is still a relatively new standard and we have observed that not all *Bluetooth* devices are created equally or work reliably. To ensure successful operation with the VEMCO VR2AR, we provide our users with a *Bluetooth* USB adapter in the VR2AR Communications Package that we are confident will provide reliable functionality.

NOTE:

Due to *Bluetooth* characteristics in water, the VR2AR must communicate with the *Bluetooth* USB adapter **through air** (typical range is 10 meters).

3.1 Install VUE software

VUE software is used to communicate with the VR2AR receiver, allowing studies to be setup and data to be offloaded. The software requires Windows XP SP2, Windows VISTA, Windows 7, or Windows 8.

The *Bluetooth* USB adapter is required for operation with the VR2AR receivers because they use *Bluetooth* communication. Others receivers may not use *Bluetooth* communication and therefore would not need the USB adapter.

STEP 1

Attach the VEMCO supplied *Bluetooth*® USB adapter (may not appear as shown) to any USB port on your PC. If the "Found New Hardware Wizard" window opens, which may happen if your PC uses Windows XP or Vista, then select "Cancel" and continue with these instructions.



If you are using Windows XP or Vista, then you must install VUE 2.1.3 or greater for the proper adapter drivers. Windows 7 and greater have the necessary drivers installed.

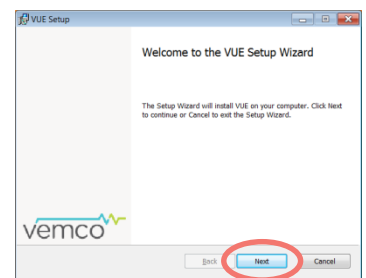
STEP 1

Follow the link in the VUE email you received. VUE is also available at www.vemco.com/downloads.



STEP 2

Click "Next" when the Install Shield Wizard begins.



Continued...

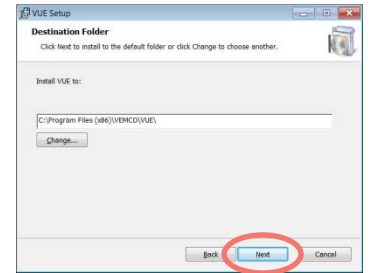
STEP 3

Read the license agreement and select “I accept” and “Next” if you agree to the terms.



STEP 4

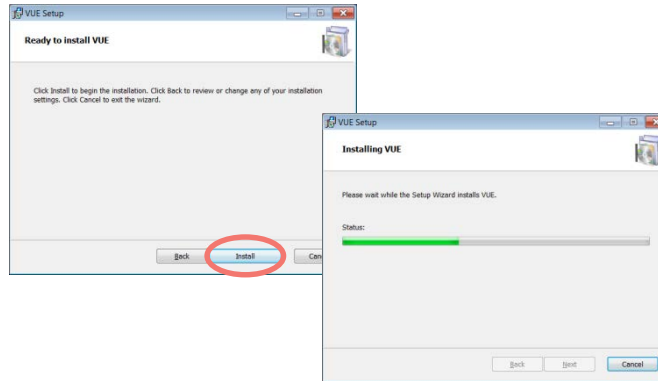
Click “Next” to install VUE in the folder shown, or click “Change” to select a different folder.



STEP 5

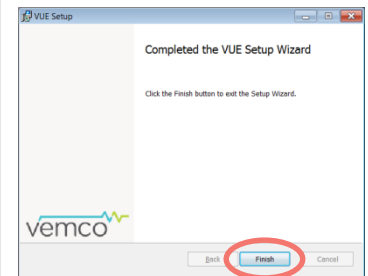
Click the “Install” button and wait while the VUE software is installed.

Click “Next” when it becomes enabled.



STEP 6

Click “Finished” to exit the setup wizard.



3.2 Activate Wireless feature

The *Bluetooth* feature in a VR2AR receiver must be activated before the VUE software will be able to find and connect to the VR2AR. Activation requires a specially designed Bluetooth Activator.

The Bluetooth Activator is a stepped cylinder made of black plastic material. A strong magnet is contained in the smaller end of the Bluetooth Activator and should be kept away from any magnetically sensitive materials. An orange float is attached to the Bluetooth Activator for easier handling and locating of the activator. This activator functions with other VEMCO receivers and receivers that use a Bluetooth Activator, such as the VR2W and the VR4-UWM.



WARNING

The Bluetooth Activator contains a **strong magnet**. Do not put it near magnet-sensitive materials, such as CRT computer monitors or magnetic stripes, as they could be seriously damaged.

STEP 1

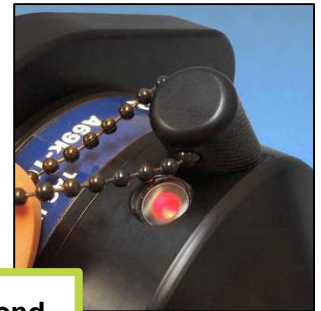
Slide the smaller end of the Bluetooth Activator in the Bluetooth Activator Hole on the VR2AR, near the hydrophone.



STEP 2

Wait until the VR2AR's LED begins flashing a bright, long, steady, red flash once a second. The wait time is less than five seconds.

Remove the Bluetooth Activator.



Bright, red flash every second

The flash pattern in a VR2AR indicates the mode (state) the receiver is in at the time. A bright, long red flash once a second indicates that the VR2AR is now ready for wireless communication but is not yet in communication with VUE.

The Bluetooth Activator can be removed from the VR2AR once the light is flashing.

TIP

It's helpful to place the VR2AR **within 10 meters** (32 feet) of the operating *Bluetooth*® USB adapter **before** activating the VR2AR.

3.3 Establish *Bluetooth* communication



After the VR2AR has been activated (section 3.2), it is ready for wireless communication with the VUE software. The VR2AR must be within communication range of the *Bluetooth* USB adapter, which is typically 10 meters (32 feet) but can vary based on physical and wireless obstructions/interference. Due to *Bluetooth*® wireless technology characteristics in water, the VR2AR must communicate to the *Bluetooth*® USB adapter through air.

VR2AR communication range:
10 meters (32 feet) through air from
Bluetooth® USB adapter.

STEP 1

Open the VUE software. The software will scan for any active devices within communication range.

Wait while the software searches for receivers.

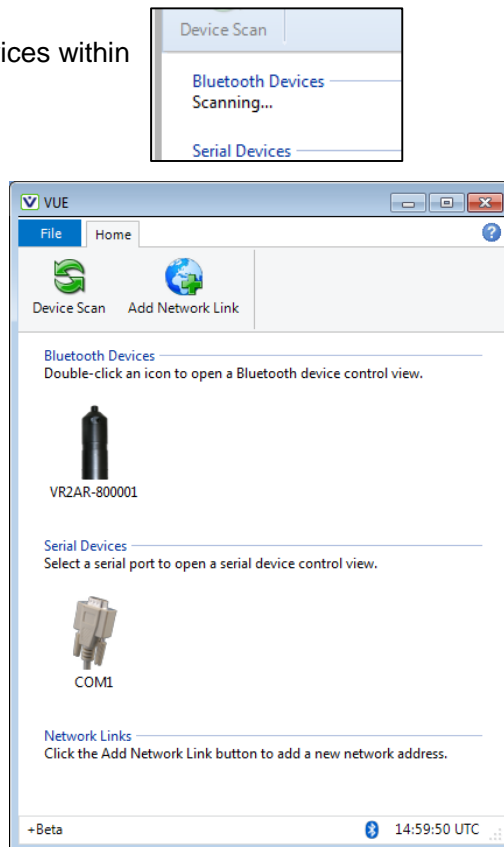
TIP: If VUE can't find your receiver(s), try again. It's not uncommon for a Bluetooth scan to miss devices, especially if other wireless devices are in the area.

When the software finds the receiver, a VR2AR icon will be displayed in the "Bluetooth Devices" section of the Home tab with the receiver's serial number for identification. It will display all *Bluetooth*® activated receivers (LED is flashing bright, long, steady, red flashes) within communication range, which is approximately 10 meters.

If wireless communication has not been activated on the VR2AR then activate communication (section 3.2) and click "Device Scan" on the software's Home tab.

Wait while the software searches for receivers.

All *Bluetooth*® activated VEMCO receivers within communication range will be displayed when a Device Scan is performed.



STEP 2

Double-click on the receiver icon of the desired VR2AR (serial number is listed under the icon) and wait while communication is established. You'll know communication was successfully established when information pertaining to this receiver is displayed and the receiver's LED is on continuously. The "Link Status" in the VUE window also changes to "Connected".



TIP: VUE can communicate with up to seven wireless receivers simultaneously.

The Receiver Tab

Each receiver currently in communication with VUE has a tab at the top of the VUE window. This tab identifies the type and serial number of the receiver. Click on a tab to bring it to the front of all the tabs, making this receiver's information visible.

Receiver type (AR) and serial number

The ribbon section contains tasks and advanced options, including offloading data, firmware upgrades, recording (initializing) and ending communication.

Receiver information specific to this VR2AR is contained in the center of the window.

The **Detection Monitor** section displays detections that are received by the VR2AR while it is connected to VUE. These detections are saved in the VR2AR memory. They can immediately be saved to the PC once "Save to File" is selected (see box at right).

A checkmark at "**Save to file**" will begin a file to save all detections received from that point forward. The file name appears in the Detection Monitor and the file is saved to the selected directory (see VUE user manual). The received detections visible in the Detection Monitor are not automatically saved.

Selecting "**Disable Timeout**" will keep the VR2AR "awake" (*Bluetooth* communication is active) until VUE is closed. This is helpful when doing in-air testing. Leaving the Timeout in place (no checkmark) allows the *Bluetooth* communication to eventually timeout and close.



CAUTION: Verify the receiver you are communicating with is **the intended unit**, particularly before initializing and erasing receiver memory files, or data could be lost. Communication can occur with any VR2AR with *Bluetooth®* wireless technology activated within a 10 meter range (typical range in air).

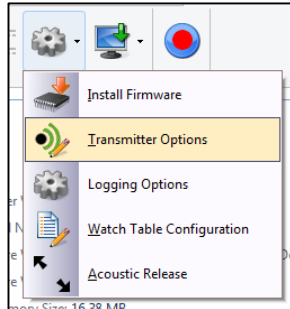
3.4 Select Transmitter Options

Transmit ID is enabled by default.

The transmitter ID, which by default is enabled, can be setup to transmit depending on the usage you have planned for the receiver. For example, if you are performing a range test, then select one of the Range Test options. The ID transmitted was selected at the time of manufacture and cannot be changed, but how often the receiver transmits its code can be selected. Perform the steps listed below to enable and setup the transmitter.

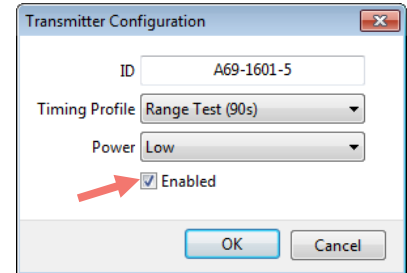
STEP 1

Click the gear shaped icon in the VUE ribbon and select Transmitter Options to open the *Transmitter Configuration* dialogue box.



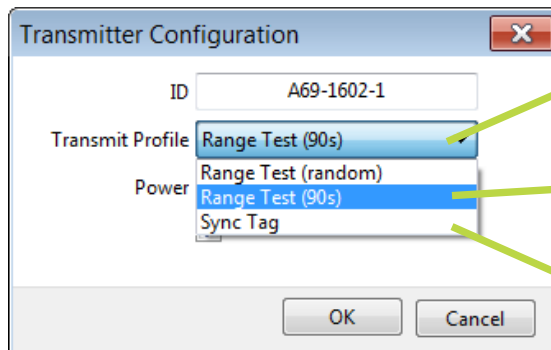
STEP 2

Verify that the “enabled” box contains a check mark. If not, then select it to enable the transmitter. The transmitting ID is shown near the top of the window.



STEP 3

Select the desired Transmit Profile from the drop-down list based on the descriptions at right. This profile determines how often the VR2AR will transmit its ID.



Range Test (random): transmits randomly between 60 to 120 seconds; nominal is 90 seconds

Range Test (90s): transmits at a fixed rate of 90 seconds

Sync Tag: transmits randomly between 540 to 660 seconds; nominal is 600 seconds (10 minutes)

Continued...

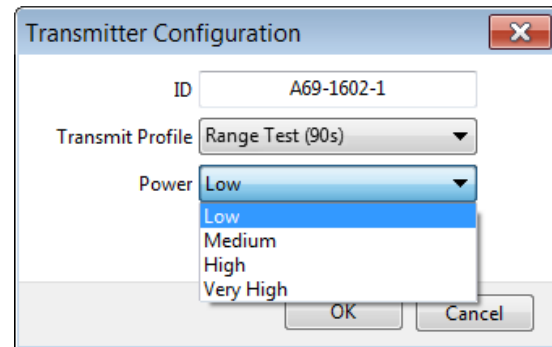
STEP 4

Select the power level at which the ID is transmitted.

A high power setting means the transmission can be heard by receivers at a greater distance.

You may wish to choose a power setting that reflects the output power of the tags you have chosen for your study, or based on the distance between receivers.

This is particularly important when using the built-in transmitter for range-testing purposes.

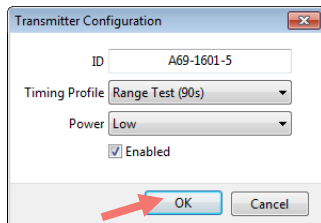


NOTE: These can be compared to output power displayed on the tag datasheets.

Low = 142 dB
Medium = 148 dB
High = 154 dB
Very High = 160 dB

STEP 5

Click OK.



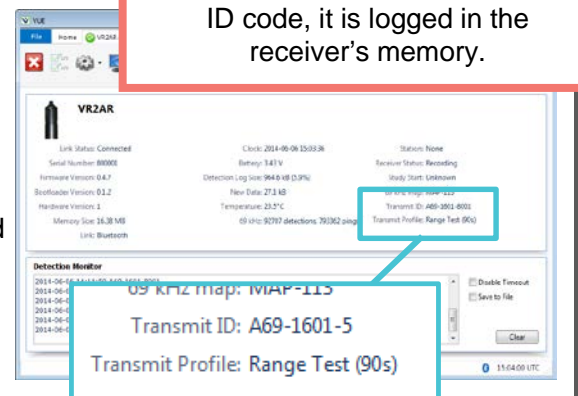
STEP 6

Verify that the Transmit Profile reported in the receiver tab is correct.

If the Transmit Profile reports "Disabled" as the profile, then the transmit feature has been disabled and the ID will not be transmitted.

Always verify the Transmit Profile is correct **before** deploying the VR2AR.

Each time the receiver transmits its ID code, it is logged in the receiver's memory.



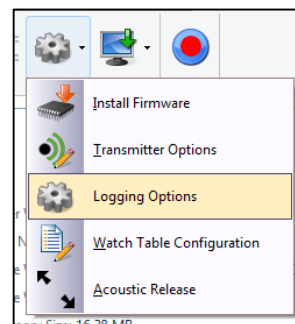
3.5 Select Logging Options

By default, the temperature, tilt, noise, and depth statistics are logged (recorded) once a day in the VR2AR memory. The time between recordings can be changed in the *Logging Options* window by selecting a different “Stats Period” for the statistic of interest.

These statistics are calculated from sample values that were taken hourly. By default, the hourly sample values are not logged to the VR2AR memory because their potential effect on the memory levels (the more memory used to store specs, the less memory there is available to record tag detections). The option is available to log the hourly samples, and to choose which statistics will be logged. If you’d like to change what is logged, follow the steps below.

STEP 1

Click the gear shaped icon in the VUE ribbon and select Logging Options to open the *Logging Options* dialogue box.



STEP 2

Select which samples should be recorded in the log. The amount and percentage of total log usage per year is listed at the bottom of the window to give an indication of the impact your selections make on memory storage. For example, logging everything uses 196.4 KiB while the default of only storing the Stats values uses 16.8KiB.

Select OK.

1 KiB (kibibyte) = 1024 bytes
(also known as a kilobyte or kB)

Ambient noise in the area can be recorded and viewed in VUE. This information may be helpful in comparing deployment locations and determining if noise may be affecting tag detections.

A screenshot of the 'Logging Options' dialog box. It contains several sections for configuring logging settings. At the bottom, it shows 'Total Log Usage Per Year: 196.4 KiB (1%)'. Buttons for 'Set Defaults', 'OK', and 'Cancel' are at the bottom right. A red box with an arrow points from the text 'Return to default settings' to the 'Set Defaults' button.

Logging Options

Stats entries are typically logged once per day (i.e., every 86400 seconds). The stats entries are calculated from sample values that are typically taken hourly (i.e., every 3600 seconds). Stats entries are logged by default because they occupy a negligible portion of the receiver log memory.

Sample entries are not logged by default because they can occupy a large portion of the log memory. Frequent sample entry logging also will reduce the amount of detection data that can be stored in the log memory.

Temperature Logging	Noise Logging
<input checked="" type="checkbox"/> Log Temperature Stats Stats Period: 86400 seconds	<input checked="" type="checkbox"/> Log Noise Stats Stats Period: 86400 seconds
<input checked="" type="checkbox"/> Log Temperature Samples Sample Period: 3600 seconds	<input checked="" type="checkbox"/> Log Noise Samples Sample Period: 3600 seconds

Tilt Logging	Depth Logging
<input checked="" type="checkbox"/> Log Tilt Samples Sample Period: 86400 seconds	<input checked="" type="checkbox"/> Log Depth Stats Stats Period: 86400 seconds
	<input checked="" type="checkbox"/> Log Depth Samples Sample Period: 3600 seconds

Total Log Usage Per Year: 196.4 KiB (1%)

Set Defaults OK Cancel

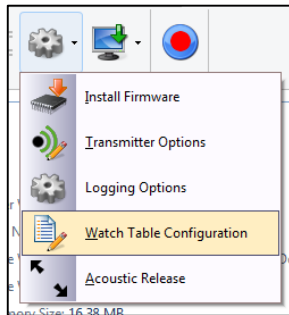
Return to
default settings

3.6 Create Watch Table

A Watch Table is a list of tags of interest and is extremely helpful in identifying if a particular tag was in the area surrounding a transceiver. The tag information is entered in the Watch Table within VUE, where each tag entered is assigned an Index number between 1 and 128. When completed, this list is sent to the receiver through *Bluetooth* communication and accessed using the VR100 while the VR2AR is deployed. How to enter the tag information is explained in the steps below. The instructions for how to access the Watch Table using the VR100 are found in the VR100 documentation.

STEP 1

Click the gear shaped icon in the VUE ribbon and select Watch Table Configuration.

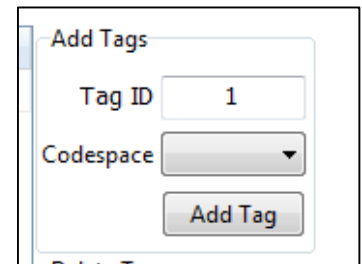


STEP 2

Enter the Tag ID of the tag you want added to the table.

Select the codespace from the drop-down list. Tag ID and codespace information was shipped with the tag.

Click the "Add Tag" button.

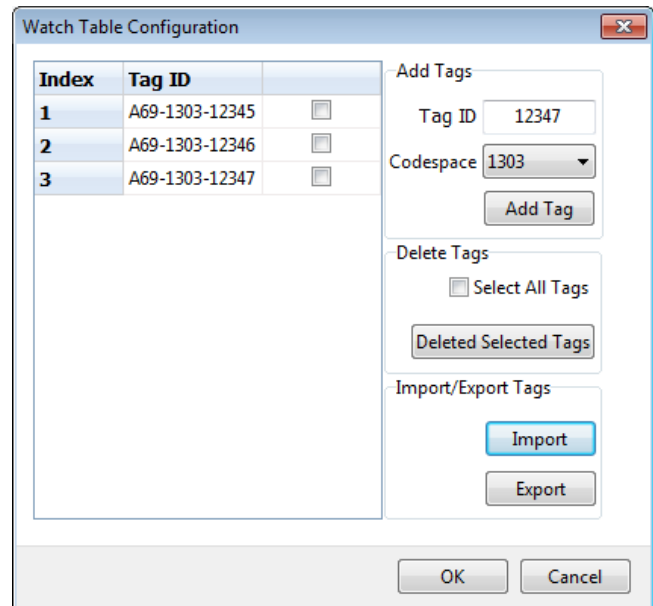


STEP 3

Continue to add tags until the Watch Table is complete based on your needs. You may add between 1 and 128 tags.

After a tag has been entered in the Watch Table, it may be selected by clicking the box to the right of the tag ID. All tags can be selected at once using the "Select All Tags" box. Once tags are selected, they can be deleted from the list using the "Deleted Selected Tags" button.

Step 4 explains the optional tasks of exporting and importing the Watch Table. If you do not need Step 4, then click "OK" to send the Watch Table to the VR2AR.



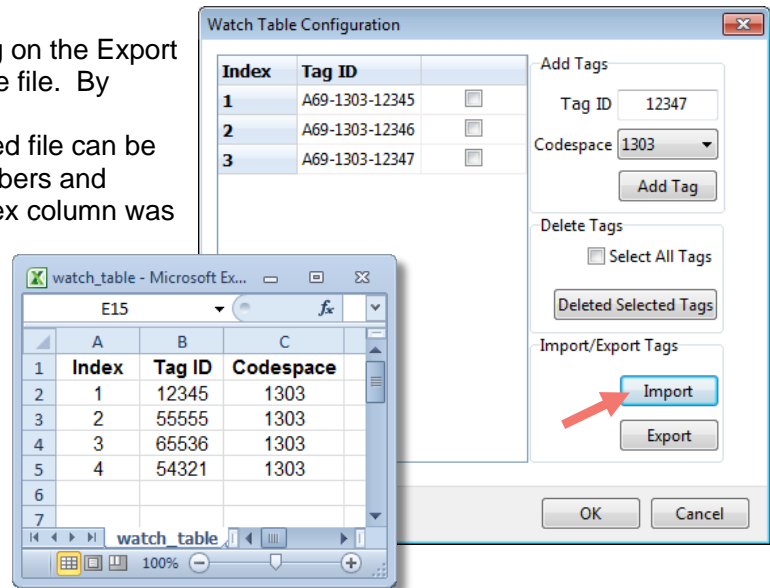
Continued...

VUE will not allow tag duplications in the Watch Table.

STEP 4 (optional)

Export the Watch Table as a .csv file by clicking on the Export button and selecting a name and location for the file. By default, the file will be saved in the ...\\Documents\\Vemco\\VUE folder. This exported file can be opened and printed so a copy of the Index numbers and associated tags can be taken into the field (Index column was added to this sample).

If there are additional receivers that need the same Watch Table as the one that was exported in Step 3, click the Import button and then select the .csv file that was previously created. The Watch Table is loaded to the receiver.

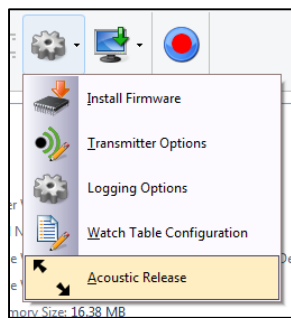


3.7 Acoustic Release in VUE

The mooring lug on the VR2AR can be released while the receiver is in *Bluetooth* communication with VUE. Under the gear shaped Device Options, select Acoustic Release. A window will open requiring you to confirm the release before the command will be sent to the receiver.

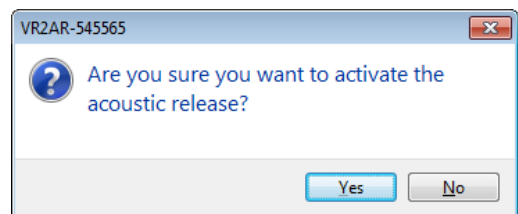
STEP 1

Click the gear shaped icon in the VUE ribbon and select Acoustic Release.



STEP 2

Select "Yes" to continue with the release.



Remember: The mooring lug must be re-armed before another release can occur. Instructions are found in section 4.4.

3.8 Record mode

The default operating mode of the VR2AR is to record received pings and detections and to transmit its ID, even while connected to VUE software. The VR2AR enters Record Mode when any of the following events occur:

- The battery is installed
- A study is started in the VUE software
- *Bluetooth* communication is closed while recording is paused

Bluetooth communication can close when any of the following events occur:

- The VR2AR is not within *Bluetooth* range for 10 minutes
- The Receiver tab in VUE software is closed by the user (red square with white “X”).
- User commands from VUE have been inactive for 30 minutes (unless option is disabled; section 7.1.7)
- VUE is closed

These events were chosen so that a VR2AR receiver would always be deployed in Record Mode. The only way a VR2AR wouldn’t be in Record Mode is if the memory was full or the battery was removed (see section 5.1).

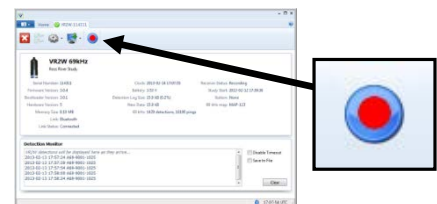
3.8.1 Start a Study

Setting up a study allows you to enter information in the VR2AR that will aid you in identifying its deployment location and even a description of the study, such as the study’s title or other information. This information is stored in the VR2AR and offloaded with the data. It can be very useful when data is being organized in VUE.

Always backup previously offloaded data **before** initializing a new study. Internal memory is erased.

STEP 1

Click the red and blue “Start Recording” button found in the receiver tab’s ribbon. This button is not available if communication between receiver and VUE is not present.

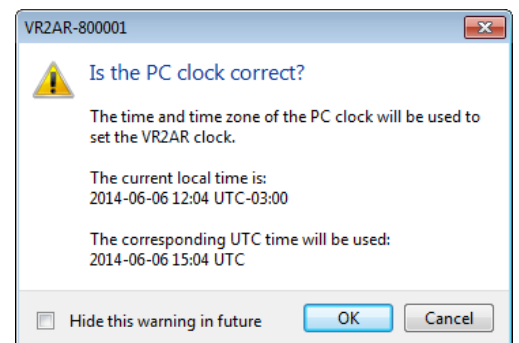


STEP 2

Review the PC clock time listed in the dialogue box that opens. The receiver will be set to UTC time based on the current time of the PC so the PC time and the UTC offset must be correct. If the time or UTC offset are not correct, then click “Cancel” and make the necessary corrections before returning to start the study. If the time and UTC offset are correct, then click the “OK” button to continue.



CAUTION: It is vital that the PC clock be correctly set to your local time, including time zone, **before the VR2AR is initialized.**

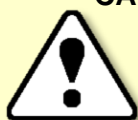
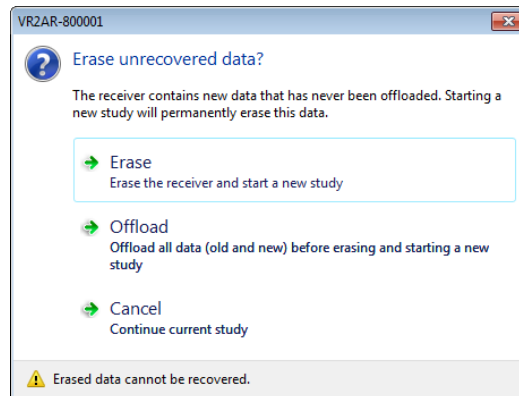


Continued...

STEP 3

Select one of the three options displayed.

- **ERASE:** when the data stored in the VR2AR has already been offloaded and you wish to erase the data and begin a new study.
- **OFFLOAD:** when the data has not been offloaded from the VR2AR, or if there is any uncertainty about the data being offloaded.
- **CANCEL:** when you wish to continue the study that is currently running in the VR2AR receiver. No changes to the study will be made.



CAUTION: Verify the receiver you are communicating with is **the intended unit**, particularly before initializing and erasing receiver memory files, or data could be lost. Communication can occur with any VR2AR or VR2W with *Bluetooth®* wireless technology activated within a 10 meter range.



WARNING

Initializing the VR2AR will erase the receiver's memory. **Retrieve all detection logs before the VR2AR is initialized.**

STEP 4

Enter a description of the study in the Study Configuration window. The station name is optional and can be selected from a list of existing stations (if a database is open) or by simply typing in the "Station Name" line to create a new station. If this station is a fixed position, then click a check mark in the "Fixed Station Position" box and enter the latitude and Longitude. If the fixed location information is already entered for an existing station, then the lat/long data will appear as soon as the station name is selected from the drop-down list.

Enter a description/title for this study.

Study Configuration

Description: Study2012

Station Name: BigRock

☒ Fixed Station Position

Latitude: 44.64047° ☒ N ☐ S

Longitude: 063.67085° ☐ E ☒ W

☐ Show Advanced Settings

OK Cancel

Select or enter a station name.

Select Fix Station to enter lat/long location of

Create a new station by entering the name in the Station Name line.

Advanced Settings includes changing the map and blanking interval.

Click OK to put the VR2AR in Recorder Mode and begin the study.

Choose unique station names for each deployment location.



WARNING

Incorrectly changing the Advanced Settings can prevent the VR2AR from detecting your tags. Only do so under VEMCO's direction.

How do I know the VR2AR is recording?

Watch the red Status Light. Two quick, bright red flashes every 5 seconds indicate the VR2AR is in Record Mode.

3.9 Offload Data

After data has been collected by a VR2AR, either during testing while in air or while in the water, that data must be offloaded to be accessed and viewed. Data can only be offloaded from a VR2AR receiver while it is in communication with VUE software through *Bluetooth®*. Follow the steps below to offload data.

STEP 1

Activate the wireless feature on the VR2AR receiver (see section 3.2)



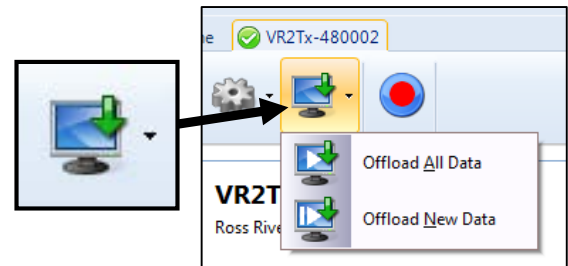
STEP 2

Establish communication between the VR2AR and the VUE software (see section 3.3).



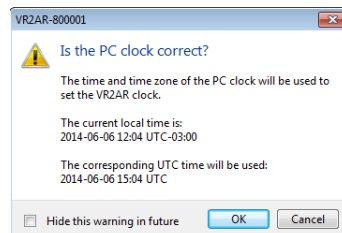
STEP 3

Click the “Offload data” icon in VUE’s receiver ribbon and choose to either offload all the data stored in the VR2AR, which will duplicate any data already offloaded during this study, or offload just the data that was stored since the last offload was performed.



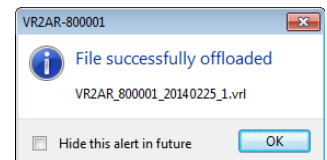
STEP 4

Verify that the PC clock is correct. If it is, then click “OK” to continue. If not, then correct the PC clock time and return to VUE to offload the data.



STEP 5

Wait while the data is offloaded. Progress is shown at the bottom of the VUE window. The name of the file created is displayed when the data has successfully been offloaded.

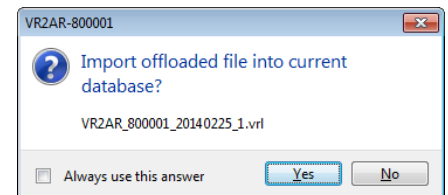


If a database is open in VUE when data is about to be offloaded, an additional dialog box appears asking if the offloaded data should be imported directly into the open database. If “NO” is selected, then the file(s) will be saved to the directory and in the format selected in the Offload tab of the *Options* window (see VUE manual for details) and will not be imported to the database. The created file choices are:

- VRL files only
- VRL files and CSV file
- VRL files and legacy VR2 files

The offloaded data will be stored in the selected file type(s) and location regardless of if the data is directly imported in to the VUE database or not.

If a database is not open when data is offloaded, then the data will automatically be saved in the file format(s) and directory selected in the *Options* window.



3.10 Disconnect communication with receiver

Click the “Close View” button (red box with white X) to disconnect the communication between the VR2AR and VUE software. A window will appear to confirm that you want to close the VR2AR View window.



When the communication is disconnected, the VR2AR resumes recording with the last study that was initialized. Ending communication does not re-initialize the receiver.

4 Deployment

How a VR2AR receiver is deployed is driven by the environment it is being deployed in and the type of study being performed. Some important points to keep in mind when designing a deployment plan for your VR2AR receivers are explained here. The common method for attaching a VR2AR to a mooring line is also given, along with the dimensions of the VR2AR cases.

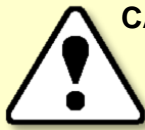
4.1 Deployment Facts/Tips

4.1.1 Mooring

VR2AR receivers are moored in many configurations often reflecting the bathymetry and oceanographic/weather conditions. A simple mooring design generally works well. In rougher conditions, heavier weights and mooring lines are usually required. A buoyancy of 7 - 14 kg (15 - 30 lbs.) is recommended to raise the VR2AR when no biofouling has occurred – adjust this as needed for your deployment location conditions. The floatation must be suitable for the depth at which it will be deployed.

The VR2AR should be positioned above the floor such that it has an unobstructed “view” of tagged animals within their expected acoustic range. Ensure the VR2AR’s hydrophone is unblocked (e.g. position a buoy a few feet above the hydrophone to allow an unobstructed view of the surface) and free of any biofouling. In high flow locations, you may consider using hydro dynamically shaped buoys and low profile anchors.

For the best horizontal range and acoustic communication, mount the VR2AR receiver in a vertical position with the hydrophone pointing up to the surface.



CAUTION: The hydrophone must be kept **free of mooring lines and obstructions**. Objects around the hydrophone will adversely affect the detection range of the VR2AR receiver.

Attach the VR2AR’s float attachment bracket to a floatation device capable of withstanding pressure since it will be submerged. Hard skinned floatation devices are recommended.

Connect the Mooring Lug to a weight. For typical deployments, we recommend using 36 – 68 kg (80 – 150 lbs.) weight with 7 – 14 kg (15 – 30 lbs.) floatation. Modifications may need to be made for deployment situations that are not typical.

During deployment, always lift the weight section separately. Never lift the weight in air by attaching to the VR2AR.

Always check the tilt of the receiver after it is deployed to verify it is vertical with the hydrophone pointing up (0-11°). This is done using a VR100-200 and a transponding hydrophone. Details are found in the VR100 Acoustic Communication manual.

Never lift the weight in air by attaching to the VR2AR. **Always lift the weight section separately.**



4.1.2 Spacing

Receiver spacing is generally determined based on range testing and historical acoustic data. Our position is that you should try to space receivers such that you achieve good detection probability in most or all weather conditions. It is not always necessary to have 100% coverage if you have several other locations where you know the animals will be passing through. However, if you wish to accurately quantify the passing of animals through receiver locations then you should strive for 100% detection probability. Typical spacing is usually between 100 and 800 meters.

See the Gate Design tutorial at www.vemco.com

4.1.3 Biofouling

Some customers use a rubber shrink tape, such as DAFLEX ST250 Cold Shrink Tape, available from Digikey (W211-ND), to prevent biofouling on the VR2AR receiver. It can be used to cover the receiver body (Do not cover the hydrophone) and does not leave a glue residue when removed. Another option is to use an antifouling paint, such as Interlux Micron CSC.

NOTE:

Keep the hydrophone uncovered to prevent acoustic dampening.



4.2 Mooring Attachment

A common method used to attach a VR2AR receiver to a mooring line is to thread the rope through one of the holes in the float attachment bracket, wrap it around the circumference of the receiver, and up through the other hole in the float attachment bracket, as shown below. A minimum rope size of 5/8" diameter nylon rope is suggested.

Pass a shackle through the mooring lug and use the 5/8" diameter (minimum) rope through the shackle.



5/8" diameter
nylon rope
(suggested minimum)



4.3 Acoustic Release

The VR2AR release mechanism is a push-off pin that is controlled by a DC motor using a titanium shaft. The exterior of the shaft is copper to reduce bio-fouling. Follow the steps listed below to release the mooring lug and allow the VR2AR to rise to the surface.

More VR100-200 commands are found in the VR100 Acoustic Communication manual.

1. Connect the transponding hydrophone to the hydrophone connector on the VR100-200 receiver.
2. Turn on the VR100-200.
3. Select “Transpond” in the main screen.
4. Select “Scan” and wait 30 seconds for the VR2AR’s serial number to appear on the screen. This minimum wait time allows all units within range to have a chance to reply.
5. Select the desired VR2AR from the list.
6. Select “Status...” from the menu (press “1” on keypad).
7. [optional] Select “Get Range” (press “1” on keypad). This establishes communication between the VR2AR and the VR100-200 and reduces the “talk time” necessary to communicate.
8. Press the “MENU” button twice to move back to the Transponding menu.
9. Select “Acoustic Release” (#3)
10. [optional] Select “Status” to view the VR2AR’s release status. It should report “unarmed” at this stage. Press MENU to go back to the menu.
11. Select “Arm” from the menu and wait for the status to change to “Armed”.
12. Select “Activate” and enter the 5-digit PIN code corresponding to this VR2AR when prompted. Select the right selection button (“Activate”) again.
13. Press MENU to go back to the menu.
14. Select “Status” to view the VR2AR’s release status as it changes from “Opening” to “Open” and to view the depth change as the VR2AR rises to the surface.

VR2AR:000001 170m
Enter the PIN code:
00000
Activate

If you need to release the mooring lug while in *Bluetooth* communication, see section 0



4.4 Re-arming Acoustic Release

The mooring lug in the end of the VR2AR must be installed before the VR2AR is deployed. Mooring lug replacements are available from VEMCO. Follow the steps below to install a mooring lug in a VR2AR:



STEP 1

Remove the thick Retaining O-ring from the end of the VR2AR. There are two flat sections next to the O-ring. Use either flat spot to aid in gripping the O-ring and removing it. Place the O-ring in a safe location for use later. Replacements are available from VEMCO.



STEP 2

Locate one end of the retaining pin. The ends can be seen inside the O-ring groove.



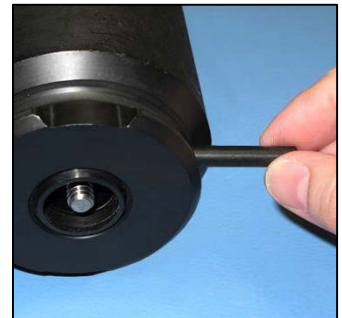
STEP 3

Use a thin item, such as a pen or pencil, to push one of the retaining pin into the VR2AR case and cause the other end of the pin to exit the case.



STEP 4

Remove the retaining pin completely from the VR2AR case and set it in a safe location for use later.

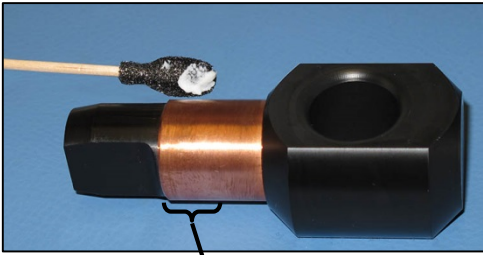


Continued...

If your mooring lug has a line (rope, cable, etc.) already attached, then slide the Retaining O-ring over the mooring lug and along the line until it is out of the way.

STEP 5

RECOMMENDED: Spread a **thin** coat of Molykote 55 O-ring grease around the copper sleeve and inside the threaded hole on the mooring lug. Also spread a thin coat around the threaded rod inside the VR2AR and on the seal at the lip of the hole.



Grease only this half of copper sleeve



STEP 6

Insert the threaded end of the mooring lug (shown below on right) onto the threaded rod in the end of the VR2AR.



STEP 7

Turn the mooring lug clockwise to thread it onto the rod in the VR2AR. Stop when the lug stops and don't over tighten.

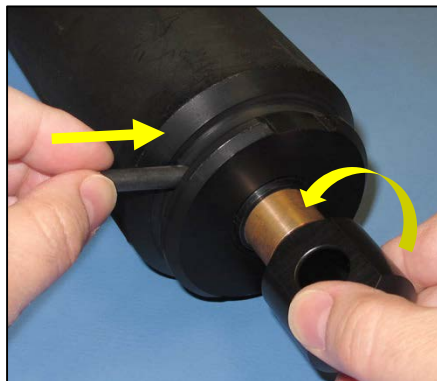


STEP 8

Insert the retaining pin into the case until it stops but keep pressure on the pin.

Turn the mooring lug counterclockwise slightly until the pin slides farther into the case.

Center the pin within the case so neither end is protruding.



WARNING

The pin prevents the lug from turning during release. Failure to install this pin would **result in the lug not releasing.**

STEP 9

Slide the Retaining O-ring over the Mooring Lug and slip one side of the O-ring into the groove.



DO NOT grease the retaining O-ring.

Continued...

STEP 10

Push the Retaining O-ring over the edge of the case so it sits in the groove.

Check the circumference of the case to verify the O-ring is securely in the groove.



5 Maintenance

5.1 Main Battery Replacement

Replacing the main battery (D-cell) in the VR2AR requires four basic steps:

1. Opening the case (section 5.1.1)
2. Removing the battery (section 5.1.2)
3. Inserting the battery (section 5.1.3)
4. Closing the case (section 5.1.4)

5.1.1 Open the VR2AR Case

A steel rod is necessary to properly open and close the VR2AR case. Every shipment of new VR2AR receivers includes a steel rod.

STEP 1



Make sure there is **absolutely no water** on or near the VR2AR case. Water, even in a small quantity, can damage the VR2AR internal circuits beyond repair. If the VR2AR is attached to a wet rope, remove the receiver from the rope before opening the case.



This also means the electronics cannot be exposed to a **sudden change in temperature and humidity** that will cause condensation to develop on the electronics and destroy the receiver.



WARNING

It is vitaly important that the electronics inside the receiver case **do not come in contact with any water** or the receiver will be damaged. For this reason, VEMCO recommends the VR2AR be opened in a controlled environment and not in the field or on the deck of a boat.

STEP 2

Place the VR2AR on a clean, flat surface so the hydrophone is hanging over the edge but the float attachment bracket is still on the surface. DO NOT let the receiver fall off the surface.

TIP: A non-slip surface, such as a rubber mat, helps keep the VR2AR in place while opening it.



Continued...

STEP 3

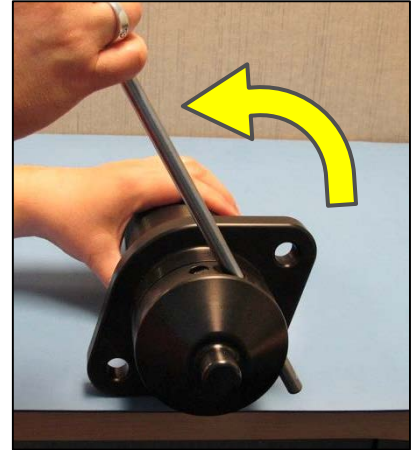
Hold the body of the VR2AR securely in place. A strap wrench on the body of the VR2AR can help with gripping the receiver.

Insert the steel rod into the Bluetooth Activator Hole on the end of the receiver and hold on to the rod – it can slide right through the hole and potentially damage something below. Make sure the rod is fully inserted into the hole – damage may occur to the Bluetooth Activator Hole if the rod is partially inserted.

Apply pressure to the rod to turn it in a counter-clockwise direction (when facing the hydrophone).

Continue to rotate the rod, and therefore the end-cap, until turning become easier.

NOTE: The Float attachment bracket may rotate on the case.



STEP 4

Remove the steel rod from the VR2AR case and set it aside.

Continue by hand twisting the end-cap in a counter-clockwise direction until the end-cap and outer cylinder separate.



STEP 5

Slide the end-cap and cylinder apart until the end has cleared the cylinder. Be very careful not to damage the threads on the end-cap or the VR2AR won't close and seal properly.



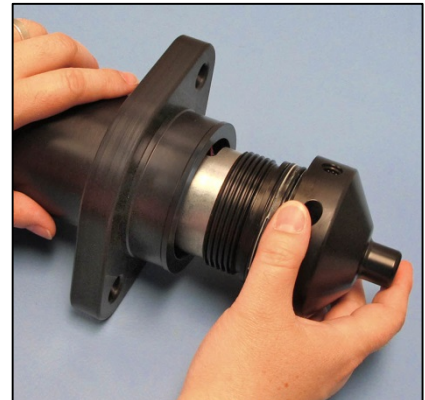
WARNING

DO NOT impact the threads on the end-cap or they will dent and prevent the VR2AR case from closing. See section 8.2.1 for tips on thread care.



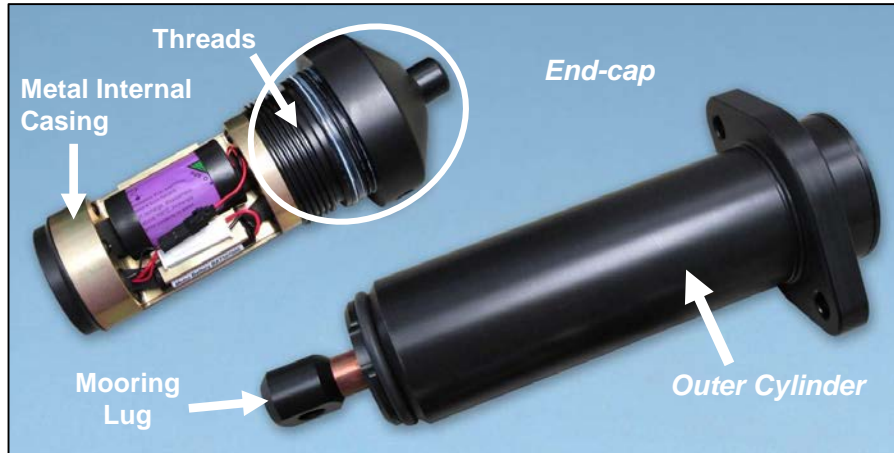
WARNING

The internal casing surrounding the electronics is not waterproof. Water, even condensation from a humid environment, will enter the case and damage the electronics.



STEP 6

Place the outer cylinder and internal casing/end-cap on a stable surface and prevent them from rolling – particularly the internal casing/end-cap.



5.1.2 Disconnecting and Removing Battery

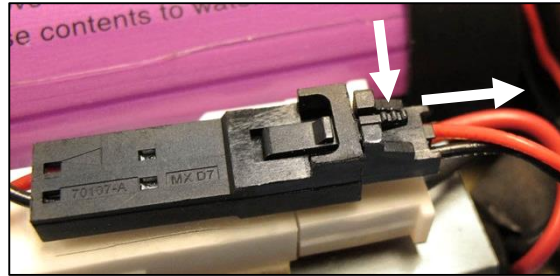
STEP 1

Open the case as explained in section 5.1.1 and set the Outer Cylinder aside.



STEP 2

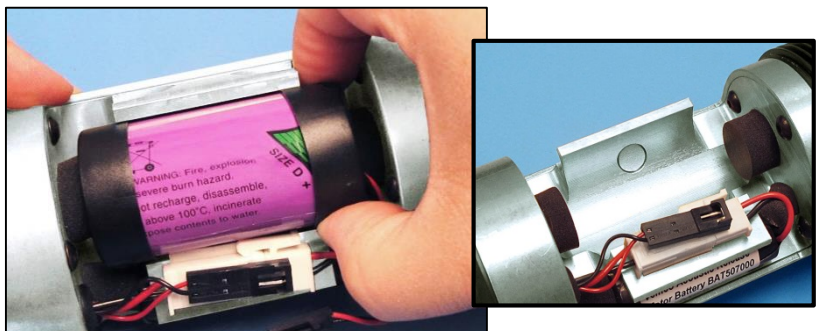
Press the release lever on the battery connector and pull the connector apart. The connector is small and a small flat screw driver may be helpful.



STEP 3

Grip one end of the battery and lift it out of the battery compartment.

Do not disconnect the AA battery.



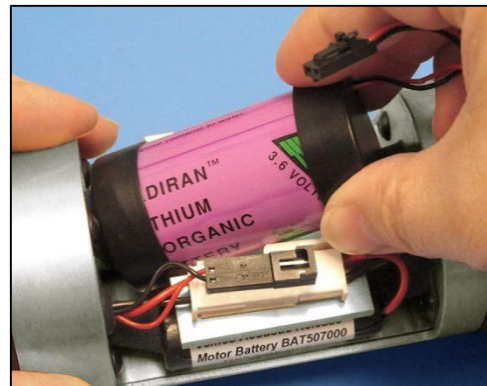
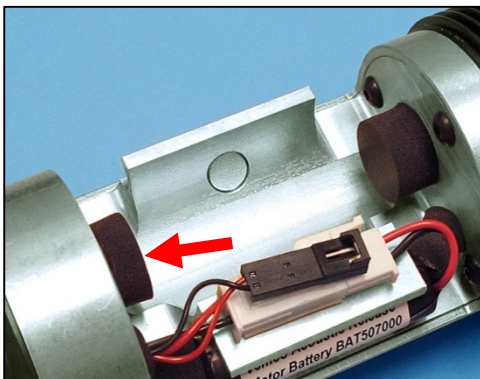
5.1.3 Install Battery

With the case open, you can install the new battery. If there is a used battery in the receiver, use the instructions found in Section 5.1.2 to remove the battery before inserting the new one. Some VR2AR receivers are shipped with the battery inside the receiver but not connected. If this is the case for your receiver, then move to Step 2 in the instructions below to power your VR2AR.

STEP 1

Slide the wireless end of the Lithium D-cell battery against the foam pad closest to the flat end of the receiver and inside the battery compartment (see arrow in photo below and left).

Press the wired end of the battery down into the battery compartment.



STEP 2

Position the receiver so you can see the Status Light.

Connect the two battery connector halves together until a "click" is heard and the VR2AR receiver's light begins flashing. Watch for a long green light to indicate the self-tests were successful. If you see the long red light followed by more flashes, then contact VEMCO for instructions.



NOTE: If the VR2AR was in Recording mode (i.e. as Study had been initialized; see section 3.8) when the battery was disconnected, then it will immediately return to recording detections after the battery has been replaced. Settings are not lost when the power is disconnected.

5.1.4 Close the VR2AR Case

Before deploying or storing a VR2AR receiver, the case must be properly closed and sealed to prevent damage to the electronics. Even humidity in the air can, over time, cause damage to the electronics so it's very important to keep the case sealed with a functioning desiccant pack inside. Important information about storing a VR2AR is found in section 5.3.

STEP 1

Make sure the serial number around the outer cylinder matches the serial number on the internal casing. This is particularly important when more than one VR2AR is open at the same time.



STEP 2

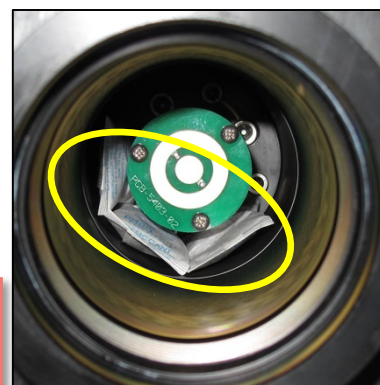
If this is the first time closing the VR2AR case, then make a visual inspection of the O-rings and the O-ring surface inside the outer cylinder to be sure they are still clean, properly greased, undamaged, and debris free. Details are found in section 5.2.

If the VR2AR has previously been deployed, then follow the O-ring inspection/replacement instructions in section 5.2 to improve the seal in the case before continuing.



STEP 3

Hold the receiver in an upright position and place three new desiccant packs (if the existing packs have been used during a deployment) in the bottom of the Outer Cylinder, **past the green/gold connection plate**. This is to prevent the desiccant packs from being *pinched* when screwing the top back on (see Steps 4 and 5).



Desiccant packs have been included in the bottom of the VR2AR to reduce the occurrence of condensation in the VR2AR. Three of these packs should remain in the receiver case during storage and deployment.

We recommend that you replace the desiccant pack with each deployment and with each battery replacement cycle.

More information on the availability and usage of these packs is located on our website, www.vemco.com.

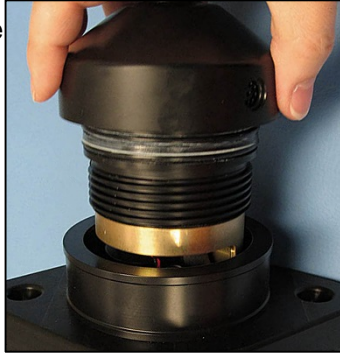


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STEP 4

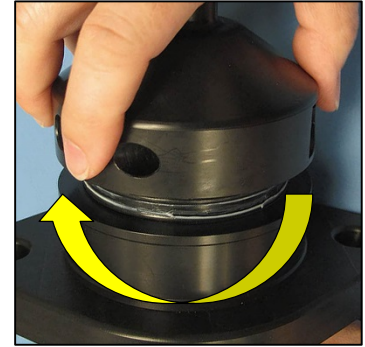
Hold the receiver in an **upright position** and slide the internal casing into the Outer Cylinder, flat end first, until the first threads are inside the outer cylinder.

Ensure that the O-rings remain properly seated in their grooves as the end-cap is moved into the outer cylinder.



STEP 5

Hold the receiver in an **upright position** and turn the end-cap in a *clockwise* direction (when looking at the hydrophone) until it becomes too hard to turn.



STEP 6

Place the VR2AR **on its side** a clean, flat surface so the hydrophone is hanging over the edge but the float attachment bracket is still on the surface. **DO NOT** let the receiver fall off the surface.

TIP: A non-slip surface, such as a rubber mat, helps keep the VR2AR in place while closing it.



STEP 7

Insert the steel rod into the Bluetooth Activator Hole and hold on to the rod – it could slide through the case and potentially damage something below. Make sure the rod is fully inserted or damage may occur to the Bluetooth Activator Hole.

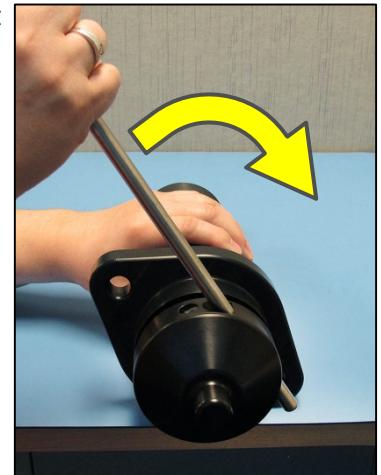
Hold the body of the VR2AR securely in place. A strap wrench on the body of the VR2AR can help with gripping the receiver.

Apply pressure to the rod so it turns in a clockwise direction when you are facing the hydrophone.

Continue moving the rod until the end cap touches the edge of the outer cylinder. Don't over-tighten the case pieces together or they may be damaged.

Remove the steel rod from the VR2AR case.

NOTE: The Float attachment bracket may rotate on the case.



WARNING

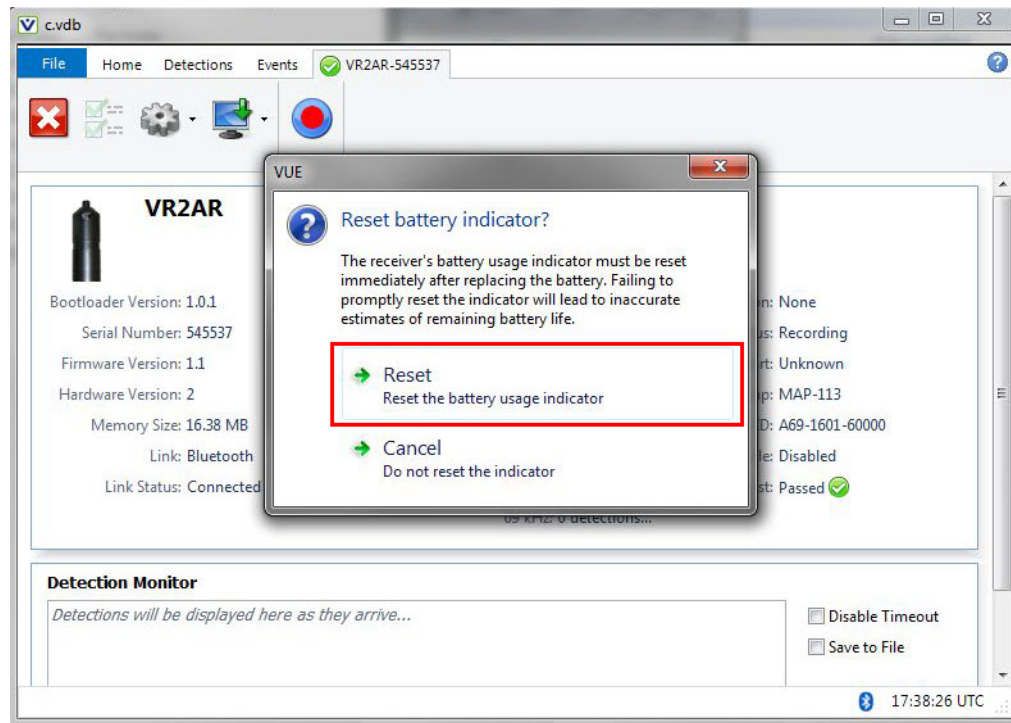
Do not over-tighten the case pieces together or they may be damaged.

5.1.5 Resetting the Battery Usage Indicator

Whenever you replace a battery, you must connect your receiver to the VUE software, and reset the **Battery Usage Indicator (BUI)**.

To connect the receiver to VUE software, see steps at sections [3.2 Activate Wireless feature](#) and [3.3 Establish Bluetooth communication](#).

Once VUE has connected to the VR2AR receiver, it will determine if a BUI reset is required, and display the following dialog box.



To reset the BUI, click **Reset**. The reset dialog box disappears, and the receiver and VUE software are now synchronized with a new date for battery replacement.

Your receiver is now ready for use.

5.2 O-ring Care

O-rings located in the end-cap of the VR2AR case are crucial to the watertight seal of the receiver. Each time an O-ring is disturbed, for any reason, it **must** be checked before the unit is sealed again. Something as simple as a stray hair could be the difference between a successful study and a damaged receiver.

Just as the O-rings are vital to a good seal, so are the O-ring surfaces. These surfaces hold the O-ring in position and must also be clean and damage free or the VR2AR case could flood with water.



Improper care of the O-rings and their mating surfaces can result in water leaking into the receiver casing, destroying the electronics.



Each time an O-ring is disturbed, for any reason, it **must be checked** before the unit is sealed again.

5.2.1 Remove O-rings

The O-rings must be removed from their grooves to allow the O-rings and the grooves to be inspected and cleaned. Do not use a sharp object, which may damage the groove surface, when removing the O-rings.



Do not use a sharp object near O-ring surfaces. The surface could be damaged.

1. Use a lint-free cloth to grip two points on the O-ring with your thumb and finger, approximately 5 cm apart. It's best to start with the O-ring farthest from the case threads.
2. Pull your thumb and finger towards each other while maintaining your grip on the O-ring. This requires pressure against the O-ring and should produce a loop of exposed O-ring.
3. Grab the exposed O-ring and pull it away from the end cap, so it moves along the body of the receiver.
4. Repeat Steps 1 -3 for the other O-ring.
5. Clean any O-ring grease on the internal casing.



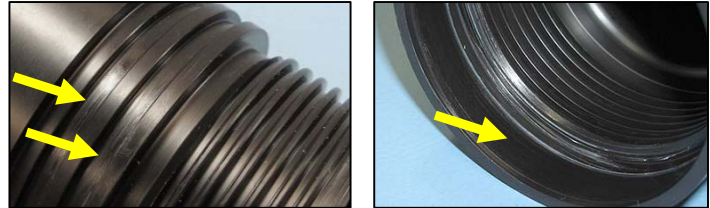
5.2.2 Clean O-ring Surfaces

The O-ring surfaces must be clear of all debris and dirt. Any debris could cause water to enter the case and destroy the receiver.

An O-ring surface is any surface the O-ring touches. The VR2AR has three, the two grooves the O-rings sit in and the smooth area inside the Outer Cylinder that sits between the threads and the end of the cylinder.

O-Ring Surfaces

An O-ring surface is any surface the O-ring touches. The VR2AR has three, the two grooves between the threads and the LED on the end cap and the first flat section inside the Outer Cylinder (2 cm).



It is vital that all O-ring surfaces are clean and damage free or water may work its way inside the case and destroy the electronics within the VR2AR receiver.

1. Use a lint-free cloth to clean the old grease and any debris from the O-rings and the O-ring surfaces. A lint-free swab is very helpful for cleaning inside the grooves.
2. Inspect the **O-ring surfaces** for any scratches or debris – use a magnifying glass and a bright light. Scratches in the O-ring groove would allow water to bypass the O-ring, potentially flooding the receiver and destroying the internal electronics. If you find debris (dirt, dust, hair, etc.) inside a groove, then use a lint-free swab to remove it. If you find a scratch in any of the O-ring surfaces, then contact our Support department.
3. Inspect the **O-rings** for debris and for any damage. If there is any question about the condition of an O-ring, we recommend it be replaced rather than risk damage to the receiver and therefore your data. O-rings can be purchased from VEMCO or locally. The replacement O-rings must be PARKER #2-143 O-RING, 70 Bn NITRILE.

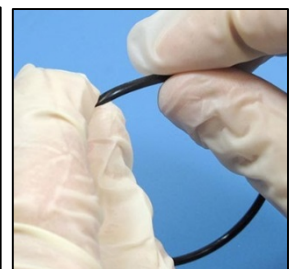


CAUTION: O-rings can stretch with continued handling. We advise that undamaged O-rings not be used for more than three deployments.

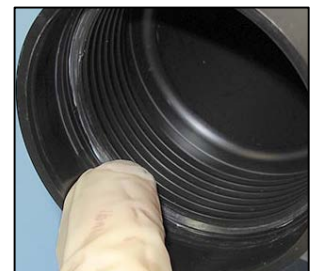
4. Use your gloved fingers to evenly spread O-ring grease (we suggest Molykote 55) over the entire surface of the O-ring until the O-ring is slippery but doesn't have clumps of grease on it. Too much grease can cause an O-ring to “pop” out of the groove while the case is being closed, giving little protection from water entering the VR2AR.



Molykote 55 O-ring grease



5. While you have grease on your glove, spread a very thin layer of the grease – enough to make the area appear shinny – around the O-ring surface on the inside of the Outer Cylinder (the smooth area between the threads and the end of the case). You shouldn't be able to see grease globs or streaks. This thin layer of grease will make screwing the two pieces together again much easier and will also help to create a better seal.



5.2.3 Install O-ring

Now that the O-rings and O-ring surfaces are clean and prepared, we're ready to install the new O-rings into the case.

1. Slowly move one of the O-rings along the body of the VR2AR to the end cap and carefully lift it over the threads.
2. Push the O-ring into the first O-ring groove and check the circumference of the receiver to make sure the entire O-ring is in the groove.
3. Slowly move the second O-ring over the VR2AR's body, over the threads, and into the remaining groove. Check that it's entirely in the groove.
4. Clean any grease that may have gotten on the body of the receiver.
5. Place the receiver on a clean surface so the O-rings remain debris and damage free.



5.3 Storage

When a receiver will not be deployed for an extended period of time, remove the D-cell battery from the receiver (section 5.1.2) to stop the VR2AR from recording. This will prevent the possibility of recording pings from noise sources during storage and also saves battery life. Storing the VR2AR with a depleted battery can negatively impact the receiver functionality.

Be sure to store the VR2AR in a safe location where the case will not be damaged. Also, be sure the temperature of the receiver during storage does not exceed the operating temperature specified in section 9.3.

Do not disconnect
the AA battery.

It is strongly suggested that the VR2AR not be initialized prior to storage (Do not erase data) and a backup of all offloaded data is made immediately.

6 Additional Information

6.1 Flash Memory

The VR2AR receiver uses 16 MB of non-volatile Flash Memory (memory that can retain stored information even when not powered) to store valid detections of coded transmitters and the date/time at which the detection was recorded. The VR2AR will not continue to record received data once the memory is full.

6.1.1 Time required to fill memory

A VR2AR receiver with 16 MB can store more than 1.6 million detections. How long it takes to fill the memory depends on how frequently the data is received and if any additional data is being logged (see section 0 for information about logging options). For example, if a valid detection is received every 20 seconds and no additional data is logged then it will require approximately 365 days to fill the 16 MB VR2AR memory. It will take less time if the detections are received more frequently, as illustrated in the table below.

Time required to fill VR2AR memory based on variable detection time.	
Valid detection every...	Time to fill 16 MB memory
20 Sec	12 months
30 Sec	18 months*
40 Sec	24 months*
50 Sec	30 months*
60 Sec	36 months*

* Exceeds battery life of the VR2AR

6.1.2 Time required to offload memory

The time required to offload the data from a VR2AR depends on how much data is stored in the memory. The table below lists the approximate times required to offload data from a VR2AR based on the amount of data stored in memory. These times are approximations only – actual offload times can vary on a number of factors, including the distance between the receiver and PC, the number of connected Bluetooth devices, and any obstacles between the receiver and the PC that can cause interference. Offload times can also vary if a Vemco-supplied Bluetooth dongle is not being used (i.e. built-in Bluetooth radios in laptops).

Time required offloading data from VR2AR to PC based on various amounts of data.	
Amount of Memory Used (MB)	Time to offload from VR2AR (minutes)
1	1.6
2	3.3
4	6.6
6	9.8

6.2 Status Light Flashes

The Status Light (LED) on the side of the VR2AR case flashes based on the task being performed or the status of the receiver. The flashes can be interpreted using the table below.

Status Light Flash meanings	
VR2AR LED Flashes	Interpretation of Flashes
No flash	Battery is disconnected or has depleted
Two quick red flashes every 5 seconds	VR2AR is in record mode (records any received pings)
Two quick red flashes every 10 seconds	The VR2AR memory full
One short red flash	An acoustic ping was received
One long red flash	A complete detection was written to memory
One short green flash*	An acoustic ping was transmitted
One long green flash*	Transmitted pings were written to memory
Continuous long red flashes (1 per second)	The VR2AR is ready for <i>Bluetooth</i> wireless technology communication
Red light on constantly	Communicating with VUE software using <i>Bluetooth</i> wireless technology

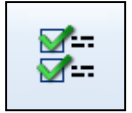
* Green flashes only occur if the transmit feature is enabled (section 3.4).

The Status Light (LED) on a VR2AR flashes either red or green. Generally, the red flashes are related to received pings and the green flashes are related to transmitted pings. Just after a VR2AR is powered, it performs a self-test and flashes both the green and red lights at the same time, making the light look more of an orange colour. After these “orange” flashes, you will see either a very long green light to indicate the tests passed and all is well, or a long red light to indicate there was a problem. If you see the long red light followed by more flashes, then contact VEMCO for instructions.

When the transmit feature is enabled in the VR2AR, the status light will flash a quick flash for each ping sent and a longer green flash to indicate that the pings were recorded in the VR2AR memory.

6.3 Set Local options

The local options feature (icon shown at right) allows you to change which suppressed pop-up queries are visible. This feature is only enabled on the ribbon if there are queries that have been suppressed. To enable a query, select “Always Ask” and that query will be enabled the next time that feature is used. For example, if “Confirm before closing VR2AR” is selected, then a query will open the next time *Bluetooth* communication with a VR2AR is closed.



Changing an action is also possible in the Control Setting window, without enabling the query. For example, if “No” was selected when the “Import offloaded files into database” was disabled and you now want to import the data without being queried each time, then click the drop-down menu next to the answer and select “Yes” from the list.

Be sure to select “OK” to apply the changes.

VR2AR-800001

Each of these settings was originally selected by choosing to suppress a pop-up query. You may change the settings or restore the pop-ups. When a pop-up is restored, the setting will no longer appear in this list.

Question	Answer	Always Ask
Confirm before closing VR2AR	N/A	<input type="checkbox"/>
Confirm successful file offloads	N/A	<input type="checkbox"/>
Verify PC clock before use	N/A	<input type="checkbox"/>

OK Cancel

6.4 Batteries

The VR2AR receiver is powered by a “D” size 3.6 Volt Lithium battery with a connector attached – the Tadiran TL-5930/F and a Tadiran TLM-1550 4 Volt AA Lithium battery. Specifications for both batteries are found in section 9.3 (Appendix). Other battery options, including a non-dangerous goods battery option, are available directly from VEMCO. Contact VEMCO if you are interested in more information on these alternatives.

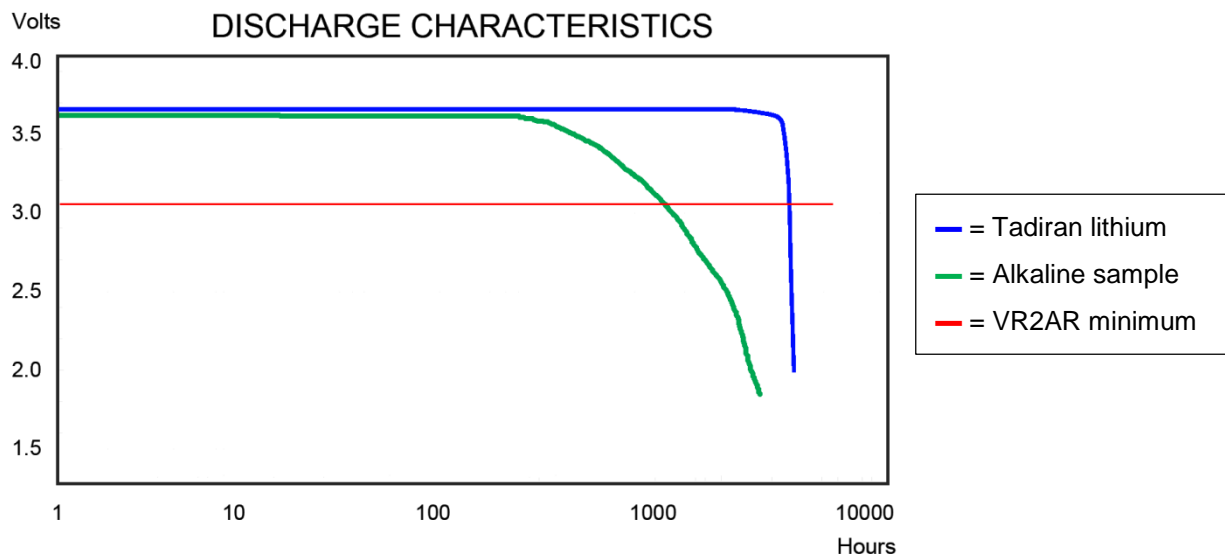


The D-cell battery powers the functions related to transmitting, receiving, and storing data. Most of the battery related information in this manual relates to the D-cell battery. The AA battery powers the release motor and contains enough power to allow more than 100 releases, depending on the amount of resistance given the motor due to biofouling. The AA battery should never need to be removed and should not be disconnected at any time.

Do not disconnect
the AA battery.

An important feature of these lithium batteries is their voltage discharge characteristics. These batteries provide a consistent voltage for most of the life of the battery, as demonstrated with the blue line in the graph below (D-cell voltages shown). This characteristic allows the receiver to operate at the necessary voltage levels longer than a battery with a more gradual voltage fall-off. This can be seen by comparing when the blue and green lines in the graph below cross the red “cut-off voltage” line.

As the graph illustrates, the battery voltage reported by a receiver may be at the correct level for proper operation even when the battery is close to the end of its life. The voltage value reported by a VR2AR indicates the battery is at the proper voltage at that moment but does not give any indication of the remaining life of the battery. For this reason, we suggest you write the date on the battery when it is installed in the receiver.



The VR2AR is usually shipped with the batteries inside the VR2AR but not connected – the VR2AR is not shipped powered. The D-cell battery life is consumed from the time the battery is connected so always disconnect the battery when the receiver is not being used for an extended period of time. This battery must be connected before the VR2AR can be initialized.



Lithium metal D-cell batteries are classified as **Dangerous Goods** and must be handled according to UN Recommendations on the Transport of Dangerous Goods (UN3090 for batteries alone; UN3091 for batteries contained in equipment or packed with it). See the MSDS from the battery company for more information.

6.4.1 Battery Life

A new Lithium D-cell battery will last approximately 14 months in a VR2AR. The AA Lithium battery is dedicated to motor operation during the release process and can perform more than 100 releases (number can vary based on amount of biofouling on the Mooring Lug connection to the VR2AR).

Approximate Battery Life Consumption

D-cell: 14 months
AA cell: 100+ releases

Larger amounts of the D-cell's battery life are consumed while the VR2AR is ready for *Bluetooth* communication or is communicating with the PC than during the receiver's Record mode. For this reason, the VR2AR exits *Bluetooth* mode as soon as the Receiver tab in the VUE software is closed (section 3.10). If the tab is left open for 30 minutes, the PC will automatically terminate the *Bluetooth* link and the receiver will enter the lower power consuming Record mode. This auto-disconnect feature, which conserves battery life, will only occur if "Automatically close inactive receiver connections" is enabled in the *Devices* section (tab) of the *Options* window in VUE (see VUE manual for details).

If the study is not continuing (i.e. the last download of data for this study has occurred), then remove the larger D-cell battery and store it separately. The used battery may be marked with the amount of life used for future reference or use. The smaller AA battery should not be disconnected or removed.

NOTE

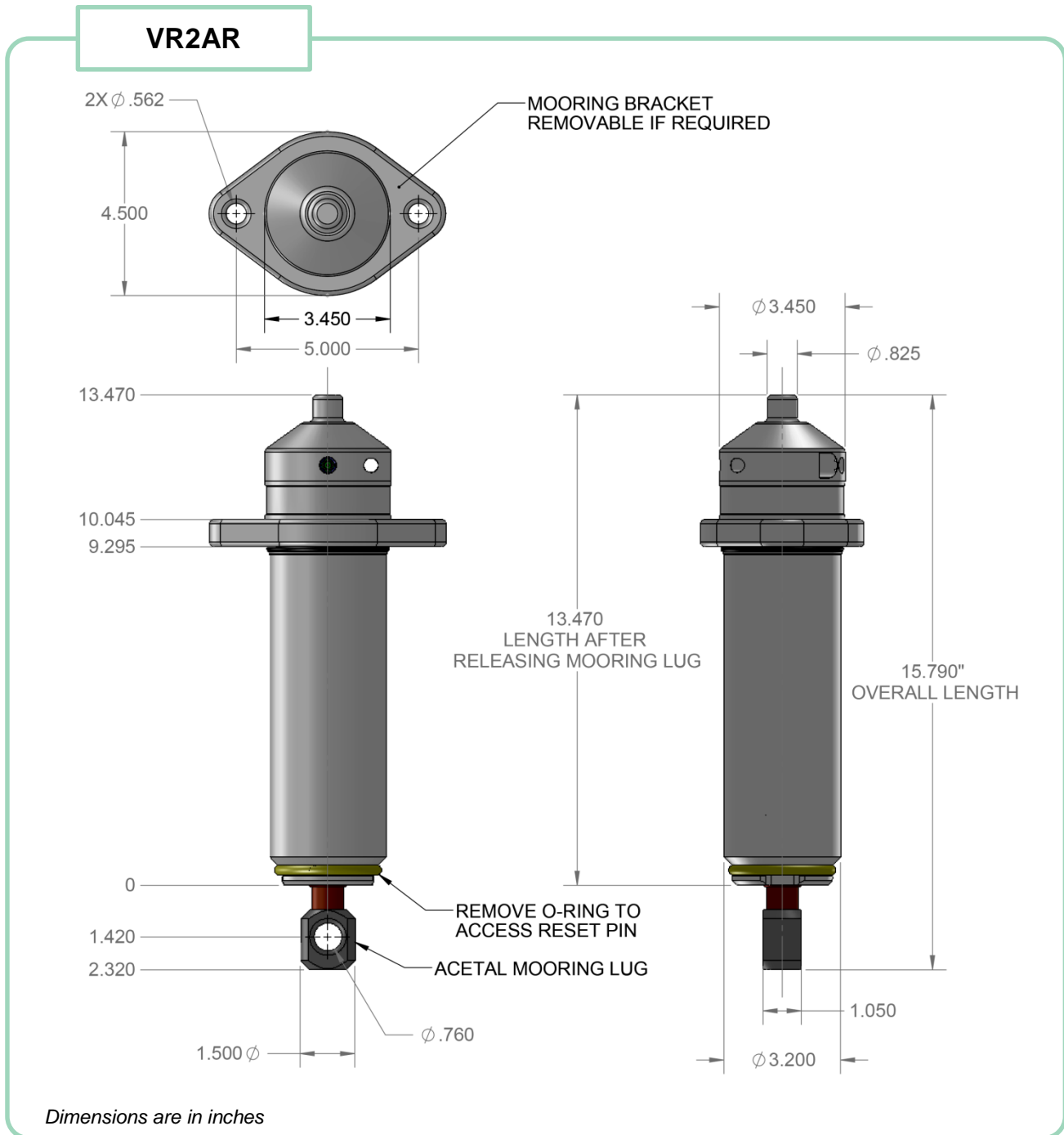
Battery life is consumed from the time the battery is **installed**, even if the VR2AR is not detecting tags or transmitting its ID code.

NOTE

Always remove the D-cell battery when the receiver is not being used for an extended period of time.

6.5 Case External Dimensions

The dimensions of the VR2AR case can be useful when designing a mooring plan or mooring equipment. The dimensions, in inches, of the case are shown in the drawing below.



6.6 Update Firmware

Firmware refers to the internal software that operates a VR2AR receiver. It is not to be confused with VUE, the PC software used to communicate with the receiver. Firmware updates are rare and will occur to either deal with a hardware change or occasionally for a significant addition to functionality. VUE 2.0.7 and greater has the ability to alert you if there is a new firmware update (feature can be disabled in the “Releases” tab of the *Options* window – see VUE manual).

How to Update Firmware Using Automated Notification:

If when you establish communication with the VR2AR (see section 3.3) you receive a message indicating VUE has detected there is a firmware update, then use the instructions below to update your firmware. To learn what caused the firmware upgrade, use the “Click here to see more” option in the notice window.

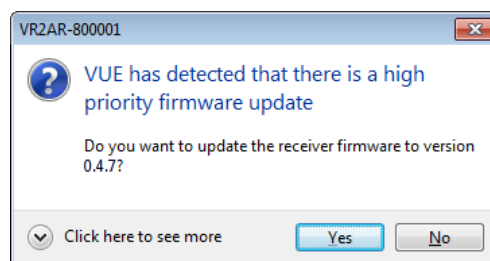
STEP 1

Decide if this is the right time to update the VR2AR firmware by answering the following questions:

1. Does the VR2AR’s battery have enough power to perform an update? If there is any doubt, then replace the battery before proceeding. ***The VR2AR could be damaged if power fails during the update.***
2. Has all the data been offloaded from the VR2AR? Updating should not erase the data, but please take the precaution of offloading all data before updating.

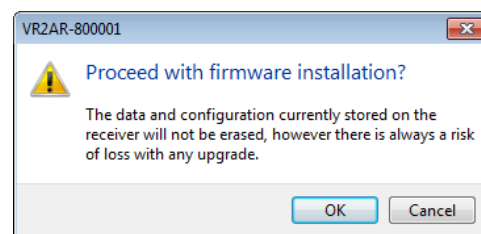
If you answered “No” to either of these questions, then click the “No” button in the notice window and either replace the battery (see section 5.1) or offload the data (see section 3.5), or both if necessary. The notice window will appear again the next time you connect to this VR2AR, or use the instructions for manually updating the firmware found in the next section.

If you answered “Yes” to both of these questions, then click the “Yes” button and continue with these instructions.



STEP 2

Assuming all data has been offloaded from the VR2AR and is safely stored on your PC, click “OK” to acknowledge this warning and continue.

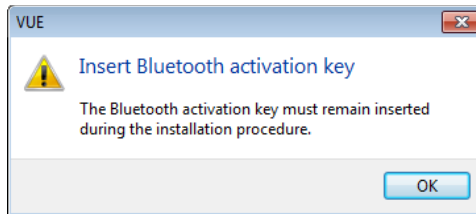


Continued...

STEP 3

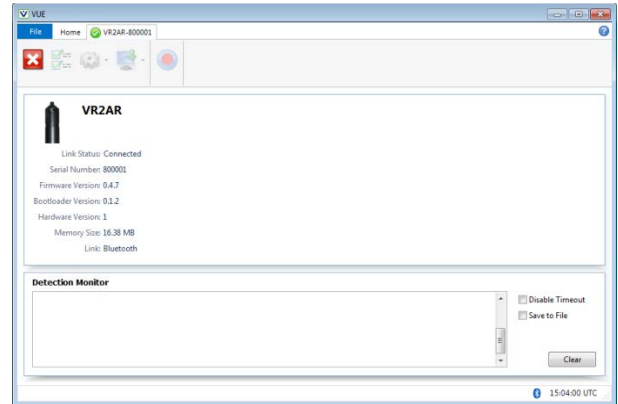
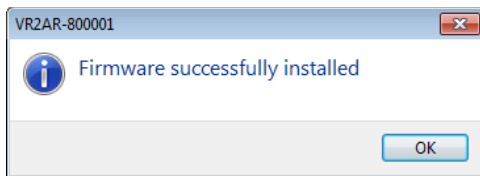
Verify that the Bluetooth Activator is still in the receiver, or place it in the receiver if it had been removed. This is important as the VR2AR will require it to be in place to re-establish communication during the procedure.

Keep Bluetooth Activator in VR2AR!



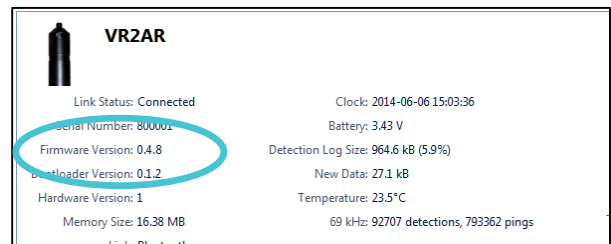
STEP 4

Wait while the firmware is loaded into the VR2AR. The status of the update is shown at the bottom of the screen. Click "OK" when the firmware is installed (see below).



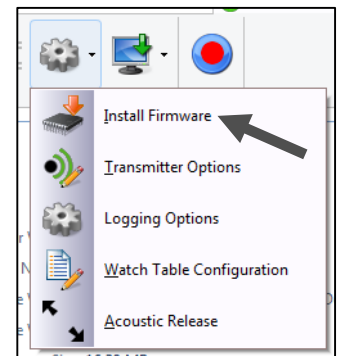
STEP 5

Confirm that the VR2AR has updated to the new firmware by checking that the firmware version number listed in the Receiver tab is correct.



How to Update Firmware Using Manual Procedure:

If the automatic notification doesn't appear, then you can manually update the firmware. Before beginning, use Step 1 in the previous section to prepare for the update. Once the preparations are completed, select "Install Firmware" on the VR2AR tab. A window titled "Select Firmware File" will appear. Select the most recent firmware file that matches your model of VR2AR. VUE software will not let you install a firmware file for the incorrect model type. Click the "Open" button to continue. The rest of the procedure matches the instructions found in Steps 2 – 5 in the automated notification section.



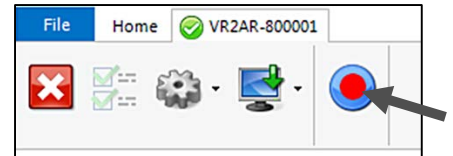
6.7 Map Updating

Occasionally, VEMCO releases a new coded map. Updating the map in the VR2AR is as simple as starting a new study with the new map selected. Follow the basic steps below to start a study with the new map. More details on how to initialize the receiver is found in section 3.8.1.

WARNING

Setting up a receiver with an incorrect map may result in no detection data.

1. Download the latest VUE software from www.vemco.com/downloads/.
2. Communicate with the VR2AR receiver (sections 3.2 and 3.3).
3. Click the red and blue “Start Recording” button found in the Receiver tab’s ribbon. If you have more than one receiver connected to VUE, then make sure you have the tab of the desired receiver selected.
4. Verify that the PC clock is correct. The receiver will be set to UTC time based on the current time of the PC. The PC time *and the UTC offset* must be correct.



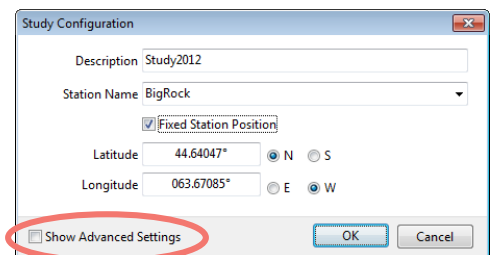
It is vital that the PC clock be correctly set to your local time, including time zone, ***before the VR2AR is initialized.***

5. Select to erase the old data and begin the study – only select this option if the data has already been offloaded to the computer.

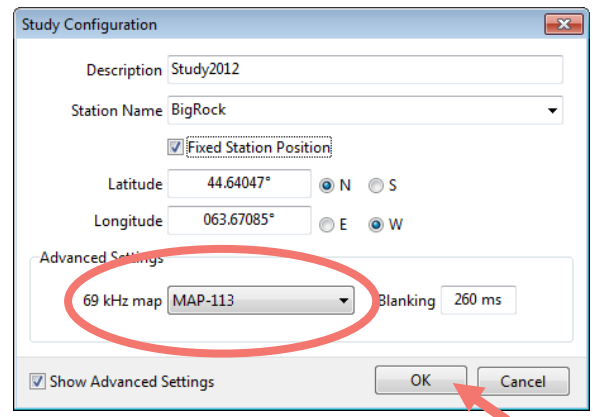
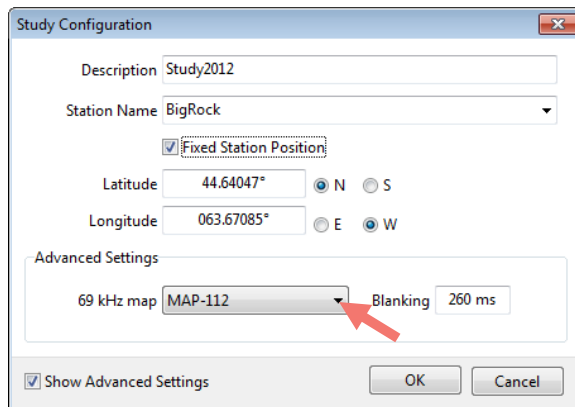


Retrieve all detection logs ***before*** the VR2AR is initialized; receiver’s memory will be erased.

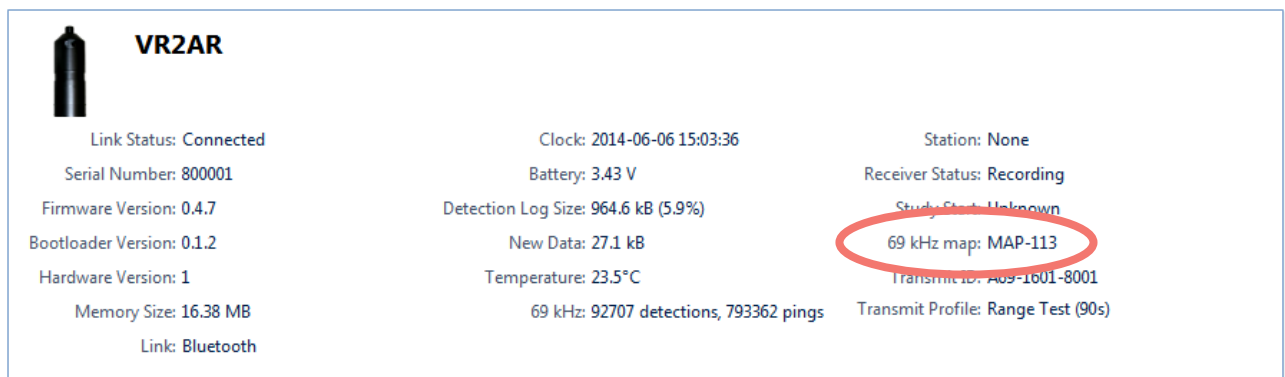
6. Select “Show Advanced Settings” in the Study Configuration window.



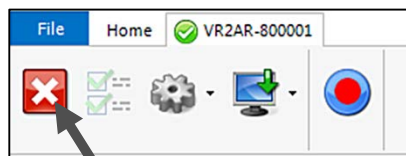
7. Click on the down-arrow to the right of the Map name (MAP-112 in this case) and select the new map (MAP-113).
8. Click the “OK” button to begin the study.



9. Verify that the Status light on the VR2AR is flashing two quick flashes every five seconds.
10. Verify that the map listed in the receiver information is the new MAP-113.



11. Close the communication connection with the VR2AR by clicking the red box with the white “X” (Close View) on the left side of the receiver ribbon.



7 Common Questions

7.1 VUE related questions

7.1.1 How/when do I change my receiver code map?

Receivers must be configured with a Code Map that defines which type of tags the receiver can detect. Check www.vemco.com for details on currently supported Code Maps and choosing the proper map for your study.

Changing a receiver map is not done often and should be done with careful attention. Setting up a receiver with an incorrect map may result in no detection data, which would not be discovered until you either communicate acoustically and check the number of detections, or retrieve the receiver and offload your data.

When a receiver is configured with a new map, the data logs are automatically erased as they are no longer valid in the presence of a different code map. Please offload stored data prior to installing a new code map.

Detailed instructions on configuring your receiver with a new code map are located in section 6.7.

WARNING

Setting up a receiver with an incorrect map may result in no detection data.

7.1.2 What is initialization?

Initialization, which is also referred to as starting a study, is an important step required to configure your receiver correctly. During initialization, you can input the station name (location) where the VR2AR will be deployed, and set the receiver clock based on your computer clock. The receiver clock is always updated based on your PC clock during the initialization process. This information will be resident with the VR2AR and will be available during offload, regardless of whether you use the same computer or not. Initialization also erases the receiver log files so be sure to offload data from your receiver before initializing it. When data is offloaded from a receiver, the VRL file created contains information about how the receiver was initialized.

WARNING

Offload your data first!
Initializing a receiver will
ERASE all data!

If a VR2AR receiver is deployed without being initialized, the receiver will detect tags but will not necessarily have the correct clock setting or map configuration required for proper data detection.

7.1.3 Why does VUE create two .vrl file types?

When a VR2AR is offloaded, VUE creates a detection file and an RLD data file. Both files have the “.vrl” extension. VUE only imports the detection vrl file (e.g., VR2AR69_800001_20140120_1.vrl or VR2AR_800001_20140120_1.vrl). The RLD data file (VR2AR69-RLD_800001_20140120_1.vrl or VR2AR-RLD_800001_20140120_1.vrl) is used by VEMCO for diagnostic purposes and should be archived in case it is required by our Support Department. The RLD data files have the letters “RLD” in the filename.

7.1.4 What Date/Time format is my data stored in the receiver and displayed in VUE?

All detection data and events are stored in the receiver in UTC (Coordinated Universal Time). UTC time is calculated by your PC and stored in your receiver during initialization. Provided your computer time and the Time Zone settings are correct and match, i.e. your computer time is correct for the time zone you have selected, then your detection data will be stored in the correct UTC format at the time of initialization and data offload.

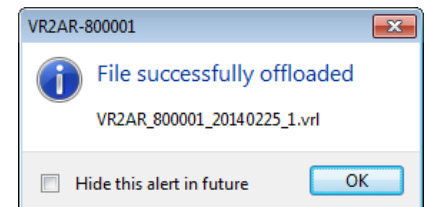
In VUE, your data is also stored in UTC format in the database. You can choose to display your detections in UTC, your local time or in a different time zone. It is important to know that regardless of whatever display format you choose VUE maintains the detection data in UTC.

Export: All detection data is exported only in UTC unless specified otherwise in VUE by selecting **OPTIONS – EXPORT – CUSTOM**

Important: If you are importing detection data from an older format detection file (e.g., VR2*.000) you must specify the time zone offset used when the receiver was initialized. Earlier VR2 receivers were most often initialized with the current PC local time unless the PC local time was set to UTC. Please contact us if you need assistance. Once these older files are imported into VUE, a new .vrl file will be created and all timestamps will be in UTC.

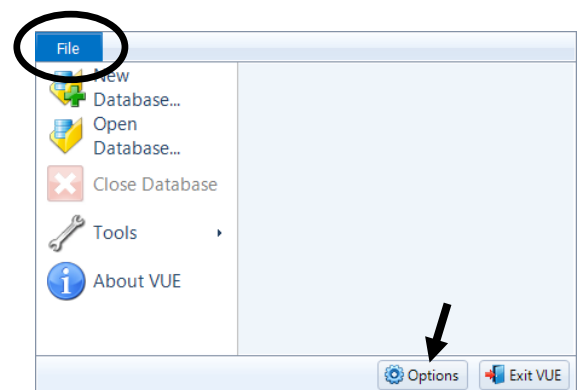
7.1.5 What does the “Hide this alert in future” mean?

There are a number of pop-up windows that appear while using the VUE software. These windows are wonderful when you’re just learning the software or when you’ve been away from it for an extended period of time, but they can be very annoying when you’re in the middle of a big study. A number of these pop-up windows have a selection box in the bottom left corner that say something along the lines of “Hide this alert in future.” Selecting this option means that this window will not appear the next time the task is performed. The pop-up windows can be returned by altering the local options or selecting “Restore All Hidden Dialogs” in the *Options* window (see section 6.3). All hidden dialogs are restored automatically if one week elapses without VUE being opened.



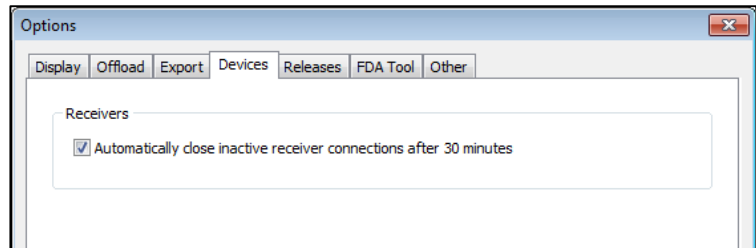
7.1.6 How do I open the *Options* window?

The *Options* window is accessed by selecting the *File* menu (circled in picture at right) and clicking the “Options” button at the bottom of the menu box (see arrow in picture at right). The *Options* window contains the following tabs: Display, Offload, Export, Devices, and Other. These are described in detail in the VUE manual.



7.1.7 I don't want VUE to disconnect from the VR2AR after 30 inactive minutes. How do I change that?

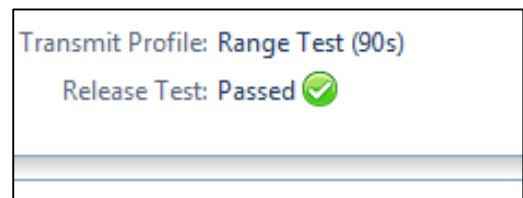
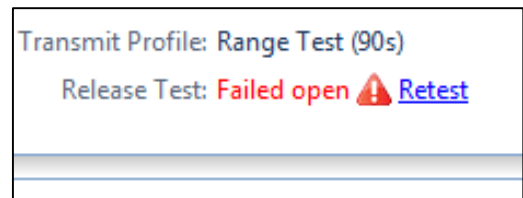
When no user activity occurs between VUE and a VR2AR for 30 minutes, VUE will disconnect the Bluetooth connection to conserve the receiver's battery. If you do not want this to occur, open the *Options* window (section 7.1.6); select the Devices tab and uncheck the "Automatically close inactive receiver connections after 30 minutes."



7.1.8 What is the Release Test?

The Release Test is performed by the VR2AR to verify that the case is closed. If the case is not completely closed, the "Failed open" warning will appear in the information listed in the Receiver tab. An open case, even if it only slightly open, will prevent the mooring lug from being deployed and provides a high risk of allowing water to enter the case and damage the receiver.

Clear a failed Release Test by securely closing the case and then click "Retest" while the VR2AR is in communication with VUE. The Release Test should change to "Passed".



7.2 VR2AR related questions

7.2.1 How much detection range can I expect?

Detection range depends on so many factors that it is difficult to estimate without knowledge of the environment and prior experience with telemetry. Range depends on transmission power, signal absorption, line of sight, reflection/refraction, multipath and environmental noise (man-made & natural), and the receiving quality of the receiver/hydrophone. Typically areas that have clear water, sand or silt flat bottoms and low current exhibit the greatest ranges. Conversely, areas with turbid water, complex rocky bottom topography and high current exhibit low ranges. In all cases, extreme weather events and periods of high wind (waves) may significantly reduce range.

In most cases greater transmission power output (dB) results in greater range. For example, in good conditions a V7/VR2AR range test could yield a range of 300-400 m and a V16/VR2AR test could yield ranges of 800-1200 m. There are some exceptions where high power and a reflective and low noise environment may cause detection breakdowns.

Please try our range calculator at www.vemco.com/customer-service/?cs-tutorials, but only use the results as a guide. One should always perform range testing to determine appropriate receiver spacing. For the enthusiast who wants to learn more about sound propagation try the widely accepted reference on underwater sound by Urick (1983). (Urick, Robert J. Principles of Underwater Sound, 3rd Edition. New York. McGraw-Hill, 1983.).

7.2.2 How long will my VR2AR battery last?

The VR2AR receiver will typically last 14 months on a single D-cell Tadiran lithium battery (model TL-5930/F). An estimation of the remaining battery life is available when acoustically communicating with the VR2AR through the VR100-200. TIP: Write the installation date on the battery so you know how long the battery has been in use.

The AA Lithium battery only powers the release motor and should never need to be removed or disconnected from the VR2AR.

7.2.3 Does receiver orientation matter?

The VR2AR must be orientated with the hydrophone looking upwards for communication with the VR100-200. Also, receivers are commonly moored closer to the seafloor than the surface to minimize the effect of surface noise and conditions.

8 Troubleshooting

8.1 VUE related troubleshooting

8.1.1 I cannot connect to my VR2AR receiver

First confirm that your *Bluetooth* connection between VUE and your VR2AR receiver is functional. If this *Bluetooth* connection is functioning correctly, try replacing the D-cell battery in the VR2AR with a new battery. If you are still unable to communicate with the unit, please contact VEMCO to receive RMA information and send the unit back to VEMCO for assessment/repair.

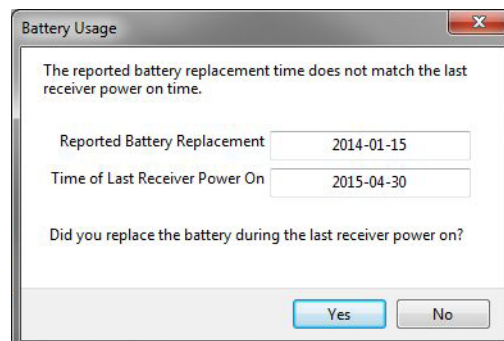
8.1.2 These detected ID's don't belong to me

We would be very pleased to help connect you with the owners of any unknown IDs. Use our Unknown IDs form at <http://vemco.com/customer-service/?cs-unknown-ids> to send a list of the unknown ID's and all associated .vrl files to the VEMCO support team. VEMCO will first review the data to identify false detections and provide you with a false detection report, then we'll contact the tag owners for all the valid detections and request that they contact you directly.

8.1.3 I see a Battery Usage Indicator reset warning in VUE

The VUE software and the firmware in your receiver have a battery replacement date feature that needs to be synchronized.

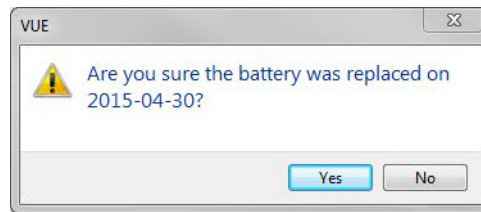
You have connected your receiver to VUE, and see the following dialog box:



You may have done one of the following:

1. You replaced a battery without connecting the receiver to VUE and resetting the Battery Usage Indicator (BUI).
2. You did not connect to VUE after having a “Power OFF” and “Power ON” event.

If you have replaced the battery: click **Yes**. A confirmation dialog box appears.



Click **Yes**. The reset dialog box disappears, and the receiver and VUE software are now synchronized with a new date for battery replacement.

If you did NOT replace the battery: If you had not connected to VUE after having a “Power OFF” and “Power ON” event, and your current battery is still good, click **No**. The reset dialog box disappears, and the receiver and VUE software are now synchronized with a new date for battery replacement.

Your receiver is now ready for use.

8.2 VR2AR case related troubleshooting

8.2.1 The threads have been damaged

It's very important that the threads on the end-cap are not dented or the outer cylinder will not thread onto the end-cap properly. If the threads on the end-cap are slightly dented, use a sharp knife, such as an X-Acto knife, to remove the deformed plastic until the sides of the thread are smooth and below the normal line of the thread. It is important that there is nothing sticking out of the thread to damage the thread on the outer cylinder or prevent the case from closing.

8.2.2 I think the case might be pressurized

When handled correctly, the VR2AR pressure case and seal have a static depth rating of 500 meters (730 psi). If the receiver experiences a pressure greater than this, then water may enter the case. NOTE: Physical shocks to the receiver, such as bumping into a solid object, when it is at any depth can result in a considerably higher pressure on the casing than just the depth pressure. Also, if the O-rings or their mating surfaces are dirty or damaged, then water may enter the receiver case.

If water enters the receiver case under high pressure and the Release Valve was unable to open and equalize the pressures, then some water and compressed air may still be in the case when it is returned to the surface. This can be identified by its increased weight and a sloshing sound when the case is moved. The VR2AR case will also be very difficult to open, if at all possible. If you are suspicious there is compressed air in the receiver case, then check for air or water leaking from seam in the case where the end-cap and outer cylinder meet.

To check for...	Do this
water leakage	dry the seam completely and watch for drops of water around the seam
air leakage	spread soapy water around the seam and watch for bubbles indicating air escaping

If air and/or water are found leaking from the receiver case, do not attempt to remove the end-cap. Instead, place the receiver in a safe place and cover it with a protective layer of towels, tarpaulins, etc. until the leaking stops. If water is still in the case after the air and/or water have finished leaking from the case, then attempt to open the case with the steel rod kit. If it will open, do so very slowly to allow the compressed air to escape. If the case will not open using the steel rods, then it is under a greater pressure than will allow the case to open. Contact VEMCO for further instructions.



When the pressure has been released from the VR2AR case, carefully unscrew the end-cap from the outer cylinder (section 5.1.1). Use fresh water to rinse the internal parts of the VR2AR while avoiding skin contact with any battery electrolyte that may have escaped from the battery.

Do not attempt to re-use the VR2AR receiver after water has been inside the case. The internal casing protecting the electronics is not waterproof and the electronics have been destroyed by contact with water.

9 Appendix

9.1 Cleaning Instructions

Clean the VR2AR with a damp cloth and mild detergent. Do not use solvents. Do not use a scraper or abrasive cleaner on the LED window or the seal surfaces.

9.2 Contact Information

Product manufactured by

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Canada B4B 0L9

Phone: +1-902-450-1700

Fax: +1-902-450-1704

Web Site: www.vemco.com



9.3 VR2AR Specifications

Dimensions	Length: 397 mm, 342 mm without release lug Diameter: 81 mm Float attachment bracket width: 165 mm
Weight	2350 g in air, 490 g in water
Receive Frequency	69.0 kHz
Operating temperature	-5°C to +40 °C; Water in which VR2AR is deployed <i>must not freeze</i> .
Shipping & storage temperature	-5°C to +50°C
Battery	<p>1 - Tadiran TL-5930/F Lithium Inorganic battery or equivalent, 3.6 Volts</p> <ul style="list-style-type: none"> • Nominal capacity @ 4 mA, to 2 V 19 Ah • Rated voltage 3.6 V • Maximum recommended continuous current 230 mA • Maximum pulse current capability 500 mA • Weight 105 g (3.7 oz) • Li metal content approx. 5 g <p>U.L. Component Recognition, MH 12193</p> <p>1 - 4V Lithium AA cell battery (for release motor only)</p>
Battery Life	Approximately 14 months (using Tadiran TL-5930/F)
Memory	16 MB Flash memory (approx. 1.6 million detections, depending on sensor log configuration)
Static depth rating	500 meters (730 psi)
Ingress Protection	IPX8 to rated depth
Bluetooth wireless certifications	Bluetooth ID: B012394 FCC ID: ED9LMX9838 Industry Canada ID: IC-1520A-LMX9838

WARNING



The VR2AR pressure case and seal have a static depth rating of **500 meters** (730 psi). Physical shocks to the receiver, such as bumping into a solid object, when it is at any depth can result in a considerably higher pressure on the casing than just the depth pressure and water may enter the VR2AR case. If the O-rings or their mating surfaces are dirty or damaged, then water may also enter the receiver case. If you are suspicious that water has entered the receiver, then follow the suggestions in the Appendix for troubleshooting a pressurized case.

9.4 Warranty and Disclaimer

AMIRIX Systems Inc. Warranty and Disclaimer

WARRANTY

AMIRIX Systems Inc., doing business under its trade name VEMCO, provides a one (1) year warranty period for the Product from date of shipment.

VEMCO warrants that on the date of shipment all Products manufactured by VEMCO are free from defects in material and workmanship under normal use and service. This warranty applies to the components necessary for equipment upgrades, i.e. the VR1/VR2 to VR2W upgrade. With respect to transmitter products, while VEMCO is able to predict battery life with some certainty, VEMCO cannot guarantee that these Products will remain functional while submerged for extended periods of time. This warranty does not apply to any equipment, materials or design supplied by Buyer or a third party; re-battery services provided by VEMCO; Products for which VEMCO has not received payment; problems that results from: external causes such as accident, abuse, misuse; servicing not authorized by VEMCO; usage not in accordance with Product instructions; failure to follow the Product instructions or failure to perform preventative maintenance; usage of accessories, parts or components not supplied by VEMCO.

This warranty shall survive delivery only on the conditions and subject to the limitations set forth below.

NOTICE PERIODS

To receive a warranty remedy for a Product, Buyer must contact VEMCO's Customer Support Department during the warranty period to receive the Return Material Authorization ("RMA") instructions. Each defective Product returned for warranty remedy must be shipped at the Buyer's expense according to the RMA instructions and must include reasonable proof that the claimed defect is due to a matter embraced within the warranty set forth above and that such defect did not result from any act or omission of Buyer, including but not limited to any failure to operate and maintain the Product in accordance with VEMCO's applicable written instructions.

REMEDY

VEMCO's liability, and the Buyer's exclusive remedy under this warranty, as to a defect in material or workmanship, is limited to the repair of such defect in the accessory, equipment or part in which the defect appears or, at VEMCO's option, to the replacement of such accessory, equipment or part with a similar item free from defect. As to any item repaired by VEMCO or furnished as a replacement by VEMCO, VEMCO's liability and the Buyer's exclusive remedy to the repair or replacement of such item for any further defect in material or workmanship, provided VEMCO receives written notice at Halifax, Nova Scotia, of such further defect from BUYER within ninety (90) days after the repaired or replaced item is shipped to BUYER and provided that BUYER returns same to VEMCO as provided under "Notice Periods".

RETURNED ITEMS

All repairs, replacements and corrections described above shall be performed by VEMCO at its plant at Halifax, Nova Scotia, or at such other place as may be mutually agreeable, and with reasonable care and dispatch in order that the Product, accessory, equipment or part will not be kept out of service longer than necessary. Return to BUYER of a repaired, replacement, or corrected accessory, equipment, part or Product shall be at VEMCO's expense. Title to and risk of loss of the Product, accessory, equipment, or part returned to VEMCO pursuant hereto shall at all times remain with the BUYER, except that title to a returned accessory, equipment, part, or Product shall pass to VEMCO concurrently with shipment to BUYER of any item furnished by VEMCO to BUYER as a replacement therefore. VEMCO shall have only such responsibility for any Product, accessory, equipment, or part owned by the BUYER and in the possession of VEMCO as is chargeable by law to a bailee for hire, but shall not be chargeable for loss of use thereof.

WEAR AND TEAR

Normal wear and tear and the need for regular maintenance shall not constitute a defect under this warranty.

DISCLAIMER AND RELEASE

THE WARRANTIES, OBLIGATIONS AND LIABILITIES OF VEMCO AND THE REMEDIES OF BUYER SET FORTH HEREIN ARE EXCLUSIVE AND IN SUBSTITUTION FOR, AND BUYER HEREBY WAIVES AND RENOUNCES, ALL OTHER WARRANTIES AND OBLIGATIONS OF VEMCO AND ANY ASSIGNEE OF VEMCO AND ALL RIGHTS, CLAIMS AND REMEDIES OF BUYER AGAINST VEMCO, EXPRESS OR IMPLIED, ARISING BY LAW OR OTHERWISE, WITH RESPECT TO ANY NON-PERFORMANCE OR DEFECT IN THE PRODUCT OR IN ANY OTHER THING DELIVERED UNDER THIS AGREEMENT, INCLUDING BUT NOT LIMITED TO:

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- (C) ANY OBLIGATION, LIABILITY, CLAIM OR REMEDY IN TORT, WHETHER OR NOT ARISING FROM THE NEGLIGENCE OF VEMCO OR ANY ASSIGNEE OF VEMCO, ACTUAL OR IMPUTED;
- (D) ANY OBLIGATION, LIABILITY, RIGHT, CLAIM, OR REMEDY FOR LOSS OF OR DAMAGE TO THE PRODUCT, FOR LOSS OF USE, REVENUE, OR PROFIT WITH RESPECT TO THE PRODUCT; OR FOR ANY OTHER DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES; AND
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EXPORT

Products and associated materials supplied or licensed hereunder may be subject to various export laws and regulations. It is the responsibility of BUYER to comply with such laws and regulations.

NEGOTIATED AGREEMENT

It is fully understood by the parties that the price of the Product and other mutual agreements of the parties set forth in this agreement were arrived at in consideration of this warranty, SPECIFICALLY INCLUDING THE WAIVER, RELEASE AND RENUNCIATION BY BUYER SET FORTH ABOVE (DISCLAIMER AND RELEASE).

9.5 Glossary

Bluetooth wireless technology: A technology based on the *Bluetooth* standard which provides for fast wireless communication in air, typically over a 10 meter range.

Bluetooth USB Adapter: This is a physical device that attaches to the PC USB port and enables your PC to communicate wirelessly to the VR2AR receiver.

Code Map: Collection of code spaces that define the types of transmitters the receiver can detect.

Code Space: Nomenclature for VEMCO tags which provides unambiguous description of the coding parameters for that tag type.

Firmware: A computer program that is contained as a read-only memory in a hardware device. This program controls the hardware device and may be able to be upgraded, depending on the design of the product. The VR2AR firmware can be upgraded if there is a design change.

Offloading: Retrieving data from a VEMCO receiver and storing it in a VRL file.

Station Name: Name for a specific deployment location including lat and long parameters.

UTC: Co-ordinated Universal Time is a worldwide standard for time, sometimes referred to as Greenwich Mean Time. VUE configures VEMCO receivers in UTC time.

VRL files: Binary file format for VEMCO data logs read from VEMCO receivers.

VUE: VEMCO User Environment PC software from VEMCO.

VUE Database: A collection of imported VRL files. VRL files are all that is needed to recreate a database or to create other databases.

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